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Community Experience Distilled

Liferay User Interface Development

Develop a powerful and rich user interface with Liferay Portal 6

Jonas X. Yuan
Xinsheng Chen
Frank Yu

[PACKT] PUBLISHING
open source* community experience distilled

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Dr. Jonas X. Yuan

This book is dedicated to my wife Linda, my son Joshua, and my parents, Daxian and Zhengzi.

This book would not have been possible without your love and understanding.

Thank you from the bottom of my heart.

Xinsheng Chen

This book is dedicated to my elder sister Xinli Chen, who has always been supporting me behind the scene.

This book would not have been possible without your encouragement.

Thank you from the bottom of my heart

Frank Yu

This book is dedicated to my father and the memory of my mother.

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Preface

Liferay employs a specialized theming system, which allows you to change the look and feel of the user interfaces. As a developer, by using the right tools to create and manipulate themes with Liferay Portal, you can get your site to look any way you want it to. However, the Liferay theming system can be difficult to get started with. This practical guide provides you with a well organized manual for working with Liferay.

Liferay User Interface Development is a pioneer in explaining Liferay's powerful theming system by leading you through examples to get you to create your own themes as quickly as possible. It focuses on how portal pages are created and styled and also discusses some simple configuration and customization to change the look and feel of a portal page. Its explicit instructions are accompanied by plenty of source code. With the open source nature of Liferay, you will find a user-friendly environment to design themes with the latest user interface technologies.

Liferay User Interface Development unlocks the potential of using Liferay as a framework to develop a rich user interface.

The book starts off with how you should go about structuring a Liferay Portal web page. It identifies the components of a portal page: theme, layout, and portlets. This hands-on tutorial explains themes, portlets, and Alloy UI, which is the latest output from the Alloy Project of Liferay, in an easy-to-understand way. It covers all aspects of a theme from its inception and rendering through its consumption by an end user, with in-depth discussion.

By the end of this book, you will clearly understand themes, layouts, and the Alloy API. Most importantly you will obtain the skills to write a theme and layout templates, apply them to a portal, and also control the portlet UI through different mechanisms.

This clear, concise, and practical tutorial will ensure that you have developed skills to become a competent Liferay themer. The detailed text is accompanied with source code that allows you to play with the examples, update the code, and add custom features.

A practical guide to customizing the look and feel of Liferay-based portal applications

What this book covers

Chapter 1, *Customizing your Liferay Portal*, discussed Liferay architecture and framework, different kinds of plugins, and related development strategies.

Chapter 2, *Basic Theme Development*, addressed basic theme development, page structure, Plugins SDK, Liferay IDE, and so on. It also covered how to update each individual file in the subfolder, including CSS, images, JavaScript, and templates, and how to package, deploy, and test the themes.

Chapter 3, *Layout Templates*, addressed layout templates in detail. It introduced the basic concepts of Liferay Portal layout template, and how the theme, layout, and portlets work together to generate a portal page, how to create your own layout template, and page rendering code flow, and so on.

Chapter 4, *Styling Pages*, gave you specific and detailed answers on how to style your pages. It reviewed some Liferay terminologies, how to set up an organization, UI and usability features in Liferay Portal 6, internationalization (i18n) and localization (L10n) at different levels, UI customization of portal page, portlets, how to Add Application pop-up panel, use the Control Panel, and so on.

Chapter 5, *Advanced Theme*, provided details about what can be done for advanced themes. It covered how to change the value of the theme.parent property for theme creation, and addressed how to add color schemes, how to use Configurable settings in a theme and pre-defined theme settings, how to embed portlets in a theme, and other topics like theme upgrade, creating a FreeMarker-template theme, browser compatibility, Liferay IDE, and other development tools.

Chapter 6, *Portlet User Interface*, focused on how to customize portlet user interface. Of course, velocity templates will be useful. This chapter addressed multiple portlets support, portlet deployment, portlet and Layout, portlet content and portlet template, portlet chrome customization, Normal view and maximized view of a portlet, AJAX for portlet UI, Portable Document Format (PDF) reports and Excel reports, Vaadin portlets, common tags in portlets, portlet UI customization using hook.

Chapter 7, Velocity Templates, walked through velocity templates with you. This chapter introduced velocity template language, Velocity template, Velocimacro Velocity portlet, Five basic Velocity templates for a theme, Velocity templates and site performance, theme customization through Velocity templates, Velocity template for Web Content portlet, and freeMarker template.

Chapter 8, Alloy User Interface, focused on what's Alloy UI and how to use it. This chapter addressed the story of Alloy UI, What Alloy UI consists of, what Liferay wants to achieve with Alloy UI, Alloy form tags, node and nodelist, Ajax in Alloy UI, Alloy Plugin Widgets, and other Alloy UI features.

Chapter 9, UI Taglib gave specific details about UI tag libraries—what are they and how to use them in customization. Particularly, this chapter addressed important UI taglib, such as asset tag and categories, search container, custom attributes, tab, toggle, calendar, breadcrumb, navigation, panel, social activity, social bookmarks, discussion, ratings, diff, flags, icon, input, and many other useful UI tags.

Chapter 10, User Interface in Production, showed us how to use jQuery UI, Workflow capabilities, custom attributes capabilities in plugins; how to leverage friendly URL routing and mapping; how to use social UI, such as Open Social, Social Activities, and Social Equity; and how to add CAPTCHA or reCAPTCHA, to hook portal core UI and to deploy themes in production.

What you need for this book

This book uses Liferay portal version 6.0.5 with following settings:

- MySQL database 5.1
- Java SE 6.0
- Liferay portal bundled with Tomcat 6.0

Although this book has explored in depth the various technologies used in Liferay user interface, it explains all the topics in an easy-to-understand way. This book is for any Java developers.

If you have some basic knowledge in web applications including servlets and portlets, you will understand better the discussions in this book.

Most importantly, if you like problem-solving and have an eye for perfection, this book is written for you.

We have opened our arms to welcome you to the Liferay world.

Who this book is for

If you have basic knowledge of Java Web applications, know the basic operational functionality of Liferay, and have written a servlet or JSP file, you are ready to get the most out of this book. Whether you are a web portal engineer or an experienced Liferay Portal developer, you can benefit from this book. You are not expected to have prior knowledge of Liferay theming.

Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text are shown as follows: "The layout is a fragment that fits inside a page generated by the velocity file `portal_normal.vm` of a Liferay theme "

A block of code is set as follows:

```
<div id="content">
   <nav class="site-breadcrumbs" id="breadcrumbs">
      <h1>
         <span>#language("breadcrumbs")</span>
      </h1>
      #breadcrumbs()
   </nav>
```

When we wish to draw your attention to a particular part of a code block, the relevant lines or items are set in bold:

```
   #if ($selectable)
      $theme.include($content_include)
   #else
      $portletDisplay.recycle()
      $portletDisplay.setTitle($the_title)
```

Any command-line input or output is written as follows:

```
create <layout-template-name> "<layout template simple description>"
```

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "Therefore, it is necessary for administrators or other users with **Manage Pages** permission".

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1
Customizing your Liferay Portal

As the world's leading open source portal platform, Liferay portal provides a unified web interface to the data and tools scattered across many sources. Within Liferay portal, a portal interface is composed of a number of portlets, self-contained interactive elements that are written to a particular standard. As portlets are developed independently from the portal itself and are loosely coupled with the portal, they are apparently **Service Oriented Architecture** (**SOA**).

This book will show you how to develop and / or customize user interface of intranets or Internets with Liferay. In this chapter, we will look at:

- The features of the user interface you will have by the time you reach the end of this book
- The Liferay portal framework and architecture for customization
- The Liferay portal user interface customizing development strategies
- Theme, layout template, hook, and Alloy UI development customization
- How to find more technical information about what Liferay is and how it works

So let's begin by looking at exactly what Liferay portal and Social Office are, how to customize user interfaces, and how they work.

Liferay functionalities

Liferay currently has the following four main functionalities:

- **Liferay portal**—JSR-168/JSR 286 enterprise portal platform
- **Liferay CMS and WCM**—JSR-170 content management system and web content management

- **Liferay collaboration**—collaboration software such as blogs, calendar, web mail, message boards, polls, RSS feeds, Wiki, presence (AJAX chat client, dynamic friend list, activity wall, and activity tracker), alerts and announcements, and so on
- **Liferay Social Office**—a social collaboration on top of the portal; a dynamic team workspace solution—all you have to do is log in and work the way you want to, at your convenience.

Generally speaking, a website built by Liferay might consist of a portal, CMS and WCM, collaboration, and / or social office.

Document stores—CMS

Image Gallery is a useful tool to manage images. For instance, within Image Gallery, you would be able to add folders and subfolders for images and moreover, manage folders and subfolders. You can also add images in folders and manage those images, and furthermore, set up permissions on folders and images. Document Library is a useful tool to manage any documents. For example, within Document Library, you can add folders and subfolders for documents to manage and publish documents. The Image Gallery and Document Library make up the **Content Management Systems** (**CMS**) available for intranets or Internet. Both of them are equipped with customizable folders and act as a web-based shared drive for all your team members, no matter where they are. As content is accessible only by those authorized by administrators, each individual file (document or image) is as open or as secure as you would need it to be.

Web Content Management—WCM

Your company may have a lot of HTML text, audios, videos, images, and documents using different structures and templates, and you may need to manage all these HTML text, images, and documents as well. Therefore, you require the ability to manage a lot of web content, and then publish web content in intranets or Internet.

We will see how to manage web content and how to publish web content within Liferay. Liferay Journal (called Web Content) does not only provide the availability to publish, manage, and maintain web content and documents, but it also separates content from layout. WCM allows us to create, edit, and publish web content (called Journal articles) as well as article templates for one-click changes in layout. It has built-in workflow, article versioning, search, and metadata features.

Personalization and internalization

All users can get a personal space that can be either made public (published as a website with a unique, friendly URL) or kept private. In fact users can have both private and public pages at the same time. You can also customize how the space looks, what tools and applications are included, what goes into the Document Library and Image Gallery, and who can view and access all of this content.

In addition, you can use your own language. Multilingual organizations get out-of-the-box support for up to 36 languages or called locales (such as Hindi, Hebrew, Ukrainian, and so on). Users can toggle among different language settings with just one click and produce/publish multilingual documents and web content. You can also easily add other languages in your public, private pages, or other organizations.

Workflow, staging, scheduling, and publishing

You can use workflow to manage definitions, instances, and tasks. You can also use the Web Content article two-step workflow, **Staging Workflow**, **jBPM workflow**, **Kaleo workflow**, **Activiti workflow** and **Intlio | BPMS**. **jBPM workflow** and / or **Kaleo workflow** and / or **Activiti workflow** that can be applied on any assets such as Web Content articles, Document Library documents, Image Gallery images, and so on. In addition, Liferay portal allows you to define publishing workflow that tracks changes to web content as well as the pages of the site in which they live.

Social network and Social Office

Liferay portal supports social networking—you can easily own your accounts in Liferay with Facebook, MySpace, Twitter, and so on. In addition, you can easily manage your instant messenger accounts such as AIM, ICQ, Jabber, MSN, Skype, YM, and so on in Liferay portal.

Social Office gives us a social collaboration on top of the portal—a full virtual workspace that streamlines communication and builds up group cohesion. All components in Social Office are tied together seamlessly, getting everyone on the same page by sharing the same look and feel. More importantly, the dynamic activity tracking gives us a bird's-eye view of who has been doing what and when within each individual site.

Tagging

The portal tagging system allows us to tag web content, documents, message board threads, and more, and dynamically publish assets by tags. Tags provide a way of organizing and aggregating content. **Folksonomies** are a user-driven approach to organizing content through tags, cooperative classification, and communication through shared metadata. The portal implements folksonomies through tags. **Taxonomies** are a hierarchical structure used in scientific classification schemes. The portal implements taxonomies as vocabularies and categories, including category hierarchy, in order to tag contents and classify them.

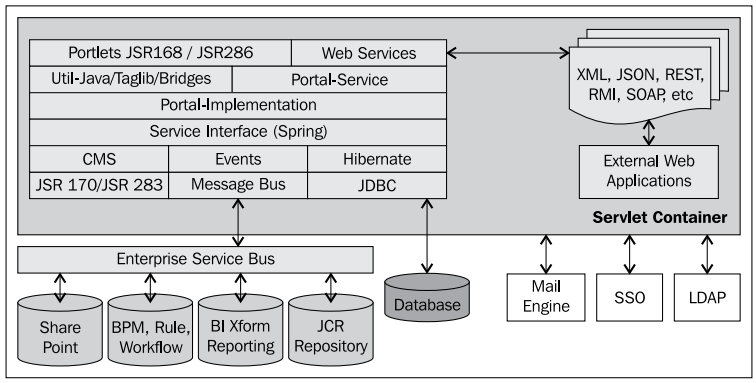
In particular, the portal provides integrating framework so that you could integrate external applications easily. For example, you can integrate external applications such as Alfresco, OpenX, LDAP, SSO CAS, Orbeon Forms, KonaKart, PayPal, Solr, Coveo, Salesforce, SugarCRM, JasperForge, Drools, jBPM, and so on with the portal. Integrating standalone Java Web applications into the portal is not an easy task. However, Liferay makes it possible to achieve near-native integration with minimal effort via **WAI** (**Web Application Integrator**) portlet or IFrame portlet.

In addition, the portal uses the OSGi framework. That is, the portal is going to support a module system and service platform for the Java programming language that implements a complete and dynamic component model. For more information, refer to `http://www.osgi.org`.

In a word, the portal offers compelling benefits to today's enterprises—reduced operational costs, improved customer satisfaction, and streamlined business processes.

Leveraging framework and architecture for user interface development

Liferay portal architecture supports high availability for mission-critical applications using clustering fully–distributed cache and replication support across multiple servers. The following figure depicts the various architectural layers and functionality of portlets.



Service Oriented Architecture

Liferay portal uses Service Oriented Architecture (SOA) design principles throughout and provides the tools and framework to extend SOA to other enterprise applications. Under the Liferay enterprise architecture, not only can the users access the portal from traditional and / or wireless devices, but the developers can also access it from the exposed APIs via REST, SOAP, RMI, XML-RPC, XML, JSON, Hessian, Burlap, and custom-tunnel classes.

Liferay portal is designed to deploy portlets that adhere to the portlet API compliant with both JSR-168 and JSR-286. A set of useful portlets are bundled with the portal such as Image Gallery, Document Library, Calendar, Message Boards, Blogs, Wikis, and so on. They can be used as examples for adding custom portlets.

In a nutshell, the key features of Liferay include using SOA design principles throughout, such as reliable security, integrating with SSO and LDAP, multitier and limitless clustering, high availability, caching pages, dynamic virtual hosting, and so on.

Enterprise Service Bus

The **Enterprise Service Bus** (**ESB**) is a central connection manager that allows applications and services to be added quickly to an enterprise infrastructure. When an application needs to be replaced, it can be easily disconnected from the bus at a single point. Liferay portal could use Mule or ServiceMix as ESB.

Through ESB, the portal could integrate with SharePoint, BPM (such as jBPM workflow engine, Intalio | BPMS engine), rule engine, BI Xforms reporting, JCR repository, and so on. It supports JSR 170 for Content Management Systems with the integration of JCR repositories such as Jackrabbit. It also uses Hibernate and JDBC to connect to any database. Furthermore, it supports events' system with asynchronous messaging and lightweight message bus.

Liferay portal uses the Spring framework for its business and data services layers. It also uses the Spring framework for its transaction management. Based on service interfaces (Spring framework), **portal-implementation** is implemented and exposed only for the internal usage—for example, they are used for the extension environment or ext plugins. **portal-kernel** and **portal-service** (these two are merged into one package, called portal-service) are provided for the external usage (or for the internal usage)—for example, they are used for the Plugins SDK environment. Custom portlets, both JSR-168 and JSR-286, and web services can be built based on portal-kernel and portal-service.

In addition, Web 2.0 Mail portlet and Chat portlet are supported as well. More interestingly, scheduled staging and remote staging, and publishing serve as a foundation through tunnel web for web content management and publishing.

Liferay portal supports web services to make it easy for different applications in an enterprise to communicate with each other. Java, .NET, and proprietary applications can work together easily because web services use XML standards. It also supports REST-style JSON Web Services for lightweight, maintainable code, and furthermore, it supports AJAX-based user interfaces.

Liferay portal uses industry-standard, government-grade encryption technologies, including advanced algorithms such as DES, MD5, and RSA. Liferay was benchmarked as one of the most secure portal platforms using LogicLibrary's Logiscan suite. Liferay offers customizable single sign-on with Yale CAS, JAAS, LDAP, NTLM, Netegrity, Microsoft Exchange, Facebook, and more. Open ID, OpenAuth, Yale CAS, Facebook, Siteminder, and OpenSSO (renamed as OpenAM) integration are offered by the portal out of the box.

In short, Liferay portal uses the ESB in general, in order to provide an abstraction layer on top of an implementation of an enterprise messaging system. It allows integration architects to exploit the value of messaging without writing code. As you can see, understanding the framework and architecture would be helpful if you would want to customize the user interface in a proper way.

Standards

Liferay portal is built based on "Standards". This is a more technical benefit, however, a very useful one if you ever want to use Liferay in a more specialized way.

Liferay is developed based on standard technologies that are popular with developers and other IT experts. The features of Liferay are listed as follows:

- **Built using Java**: Java is a popular programming language that can run on just about any computer. There are millions of Java programmers in the world, so it won't be too hard to find developers who can customize Liferay.
- **Based on tried and tested components**: With any tool, there's the danger of bugs. Liferay uses lots of well known, widely tested components to minimize the likelihood of bugs creeping in. If you are interested, here are some of the more well-known components and technologies used by Liferay—Apache ServiceMix, Mule, ehcache, Hibernate, ICEfaces, Java J2EE/JEE, jBPM, Intalio | BPMS, JGroups, Alloy UI, Lucene, PHP, Ruby, Seam, Spring and AOP, Struts and Tiles, Tapestry, Vaadin, Velocity, and FreeMarker.
- **Uses standard ways to communicate with other software**: There are various standards established for sharing data between pieces of software. Liferay uses these so that you can easily get information from Liferay into other systems. The standards implemented by Liferay include AJAX, iCalendar, and Microformat, JSR-168, JSR-127, JSR-170, JSR-286 (Portlet 2.0), and JSR-314 (JSF 2.0), OpenSearch, Open platform with support for web services (including JSON, Hessian, Burlap, REST, RMI, and WSRP), WebDAV, and CalDAV.
- **Makes publication and collaboration tools WCAG 2.0 (Web Content Accessibility Guidelines) compliant**: The new W3C Recommendation to make web content accessible to a wide range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity, and combinations of these. For example, the portal integrates CKEditor—standards support: W3C (WAI-AA and WCAG), 508 (Section 508).
- **Alloy UI**: Supports HTML 5, CSS 3, and YUI 3 (Yahoo! User Interface Library).
- **Supports Apache Ant 1.8 and Maven 2**: Liferay portal could be built through Apache Ant by default, where you can build services, clean, compile, build JavaScript CMD, build language native to ASCII, deploy, fast deploy, and so on. Moreover, Liferay supports Maven 2 SDK, providing Community Edition (CE) releases through public maven repositories as well as Enterprise Edition (EE) customers to install maven artifacts in their local maven repository.

Many of these standards are things that you will never need to know much about, so don't worry if you've never heard of them. Liferay is better for using them, but mostly, you won't even know they are there. Of course, the user interface could be standardized, too. Therefore when developing and / or customizing user interface, you can leverage these standards.

Customization and development strategies

Liferay is, first and foremost, a platform, where you can build your own applications using the tools you feel most comfortable with, such as JSF 2, Icefaces, Struts 2, Spring MVC, Vaadin, jQuery, Dojo, and so on.

Of course, you're not required to write a lot of code for yourself. You can use **Service-Builder** to generate a lot of code. Generally speaking, the Service-Builder is a tool built by Liferay to automate the creation of interfaces and classes that are used by a given portal or portlets. The Service-Builder is used to build Java services that can be accessed in a variety of ways, including local access from Java code, remote access using web services, and so on.

In general, the Service-Builder is a code generator. Using an XML descriptor, it generates:

- Java Beans
- SQL scripts for database tables creation
- Hibernate Configuration
- Spring Configuration
- Axis Web Services and
- JSON JavaScript Interface

Plugins SDK Environment is a simple environment for the development of Liferay plugins, for example, ext, themes, layout templates, portlets, hooks, and webs (web applications). It is completely separate from the Liferay portal core services and uses external services only if required.

The portal supports six different types of plugins out-of-the-box. They are Portlets, Themes, Layout Templates, Webs, Hooks, and Ext.

- Portlets: These are web applications that run in a portion of a web page.
- Themes: These dictate the look and feel of your pages.
- Layout Templates: These are ways of choosing how the portlets will be arranged on a page.

- Hooks: These allow hooking into the portal core functionality;
- Webs: These are regular Java EE web modules designed to work with the portal, like ESB (Enterprise Service Bus), SSO (Single Sign-On), and so on. Note that a web is a pure web application where a thin layer is added to provide checking for dependencies. A web also adds support for embedding hook definition or Service Builder services within a plain old web application. And finally, you can deploy them using the auto-deploy mechanism the same way that you do with other plugins.
- Ext: It uses Ext environment as a plugin; that is, you can use the extension environment as a plugin in Plugins SDK environment. Besides hooks, this is another tool that you can use to customize the portal core functionality.

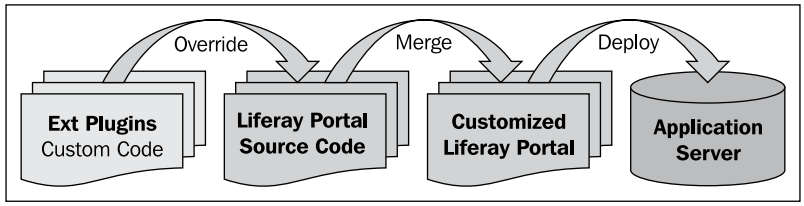
As you can see, you can generate code for plugins Portlets, Webs, and Ext. Normally you can have one project for one plugin, for example, theme, layout template, hook, ext, and web; you can have many **portlets** in one plugin project portlet. Hook plugins could be standalone, or stand with **portlets** or webs. That is, in one plugin project portlet, you can have one hook and many portlets in one WAR file. As you can see, user interface can be customized or developed within these plugins, mostly in the same way, such as portlets, themes, layout templates, hooks, and ext.

Liferay IDE is used to provide best-of-breed eclipse tooling for Liferay Portal development platform for version 6 and greater. The availabilities of Liferay IDE cover, but not limited, plugins SDK support, plug-in projects support, project import and conversion, wizards, code assist like portlet taglibs, customizable templates, XML catalogue (DAT/XSD) contributions.

Ext Plugins

The Extension environment provides capability to customize Liferay portal completely. As it is an environment which extends Liferay portal development environment, it has the name "Extension", or called "Ext". By the Ext, we could modify internal portlets, or called the out-of-the-box portlets. Moreover, we could override the JSP files of portal and out-of-the-box portlets. This kind of customization is kept separate from the Liferay portal source code. That is, the Liferay portal source code does not have to be modified, and a clear upgrade path is available in the Ext.

From version 6, Ext environment is available as a plugin called Ext plugin. As shown in the following figure, custom code will override Liferay portal source code in the Ext plugin only. In deployment process, custom code is merged with Liferay portal source code. That is, developers override the Liferay portal source code. Moreover, custom code and Liferay portal source code will be constructed as customized Liferay portal first, and then the customized Liferay portal will be deployed an application server.



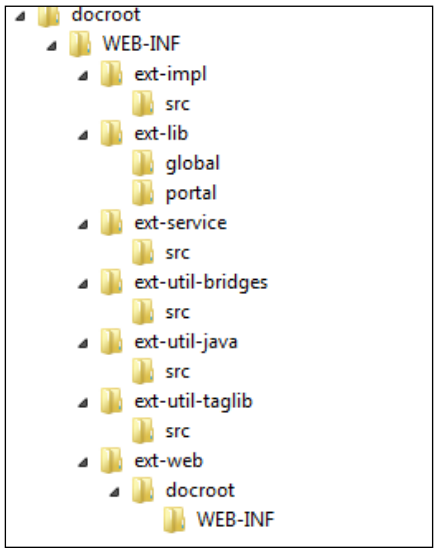
During customization, we could use the Service Builder to generate models and services. In general, the Service-Builder is a code generator, using an XML descriptor. For a given XML file `service.xml`, it will generate SQL for creating tables, Java Beans, Hibernate configuration, spring configuration, Axis Web Service, JSON JavaScript Interface, and so on.

The JSP files of the portal and the out-of-the-box portlets can be overridden with custom versions in the Ext. Note that the Ext is used for customizing Liferay portal core only, as the WAR files written in the Ext are not hot deployable, moreover, the Ext is a monolithic environment.

Under `${ext.plugin.project}/docroot/WEB-INF`, you'll see a lot of folders that start with `ext-*` as shown in the following screenshot.

- `ext-impl/src` contains code that will override `portal-impl/src`
- `ext-lib/global` is where you put jars that are available in the global class loader
- `ext-lib/portal` is where you put jars that are available only to the portal class loader
- `ext-service/src` contains code that will override `portal-service/src`
- `ext-util-bridges/src` contains code that will override `util-bridges/src`
- `ext-util-java/src` contains code that will override `util-java/src`
- `ext-util-taglib/src` contains code that will override `util-taglib/src`
- `ext-web/docroot` contains code that will override `portal-web`

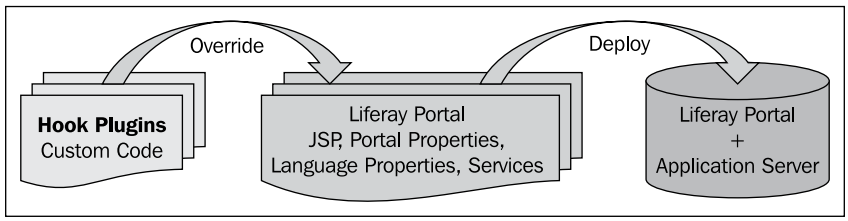
Note that if you modify `ext-web/docroot/WEB-INF/web.xml`, these changes are merged into `portal-web/WEB-INF/web.xml`. The folder `ext-web` also contains `/WEB-INF/*-ext.xml` files that are used to override what is in `portal-web`.



As you can see, Ext plugin works very similarly to that of Ext environment, but it is much smaller and more light weight.

Hook plugins

Hooks are a feature to catch hold of the properties and JSP files into an instance of the portal, as if catching them with a hook. Hook plugins are more powerful plugins that come to complement portlets, themes, layout templates, and web modules.
A hook plugin can, but does not have to be combined with a portlet plugin. For instance, the portlet so-portlet is a portlet plugin for Social Office with hooks; a hook plugin can simply provide translation or override JSP page. In general, hooks would be very helpful tool to customize the portal without touching the code part of the portal, as shown in following figure. In addition, you would use hooks to provide patches for the portal systems or social office products.



In general, there are four kinds of hook parameters:

- `portal-properties` (called portal properties hooks)
- `language-properties` (called language properties hooks)
- `custom-jsp-dir` (called custom JSPs hooks) and
- `service` (called portal service hooks)

as specified in `$PORTAL_ROOT_HOME/dtd/liferay-hook_6_0_0.dtd`.

```
<!ELEMENT hook (portal-properties?, language-properties*, custom-jsp-
dir?, service*)>
<!ELEMENT portal-properties (#PCDATA)>
<!ELEMENT language-properties (#PCDATA)>
<!ELEMENT custom-jsp-dir (#PCDATA)>
<!ELEMENT service (service-type, service-impl)>
<!ELEMENT service-type (#PCDATA)>
<!ELEMENT service-impl (#PCDATA)>
```

As shown in the preceding code, the ordering of elements is significant in the DTD (Document Type Definition)—you need to have your own `portal-properties` (only one marked by `?`), `language-properties` (could be many marked by `*`), `custom-jsp-dir` (only one marked by ?), and service (could be many marked by *) declared in the same order.

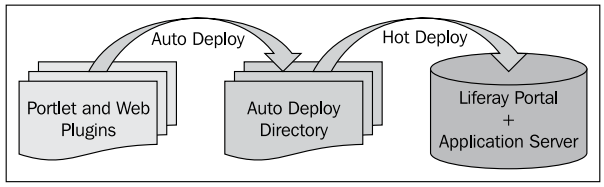
Language properties hooks allow us to install new translations or override few words in existing translations. JSP hooks provide a way to easily modify JSP files without having to alter the core of the portal, whereas portal properties hooks allow runtime re-configuration of the portal. Portal service hooks provide a way to easily override portal services. The portal configuration properties can be altered by specifying an overriding file, where the properties will immediately take effect when deployed. For example, you can enable auditing capabilities using hooks. Note that not all properties can be overridden by hooks.

Portlet and web plugins

As you can see, the Plugins SDK is a simple environment for the development of Liferay plugins, including portlets, and webs (that is, web applications). It provides capability to create hot-deployable portlets and webs.

How does it work? As shown in following figure, the Plugins SDK provides environment for developers to build portlets and webs. Later, it uses the Ant target Deploy or Maven to form WAR file and copy it to the Auto Deploy directory. Then, Liferay portal together with the application server will detect any WAR files in the auto hot-deploy folder, and automatically extracts the WAR files into the application

server deployment folder. Note that the portal is able to recognize the type of the plugin and enhance it appropriately before hot deploying it. For example, for portlets it will modify `web.xml` adding required listeners and filters.

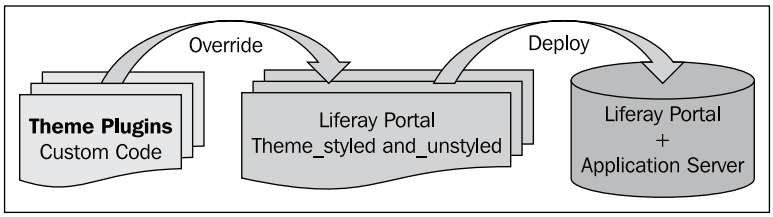


Customizing user interface through themes development framework

A theme specifies styles of all major global portlets and content, so it controls the way the portal will look. In general, a theme uses CSS, images, JavaScript, and Velocity (or FreeMarker) templates to control the whole look and feel of the pages generated by the portal. Therefore, when creating customized themes, we need to consider these four groups as well. The theme is made up of a folder `_diffs` with four subfolders `css`, `images`, `javascript`, and `templates`; and a folder `WEB-INF` with the properties file `liferay-plugin-package.properties` and, optionally, XML file `liferay-look-and-feel.xml`.

1. As shown in the following figure, when you deploy a theme, it will copy all files from the folder `${app.server.portal.dir}/html/themes/_unstyled/` to the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot/` first. In fact this will happen during build time, instead of deploy time.
2. All files from the folder `${app.server.portal.dir}/html/themes/_styled/` are copied to the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot/`, too.
3. Later, it will copy all files from the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot/_diffs/` to the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot/`. It means that you will override existing files with new files and changed files under the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot`. Here the `${theme-name}` refer to a real theme project name.

Then, you will see four folders such as `css`, `images`, `javascript`, and `templates` under the folder `$PLUGINS_SDK_HOME/themes/${theme-name}/docroot`. And each folder will contain all merged files and subfolders from `/_unstyled`, `/_styled`, and `/_diffs`.



Build differences of themes

The best practice of building customized theme is to put only the differences of customized theme into the folder `${theme-name}/docroot/_diffs`. Here `${theme-name}` refers to any theme project name such as, for example, `book-street-theme`. Using the best practice, we need to put customized CSS, images, JavaScript and templates in the folder `/_diffs` only.

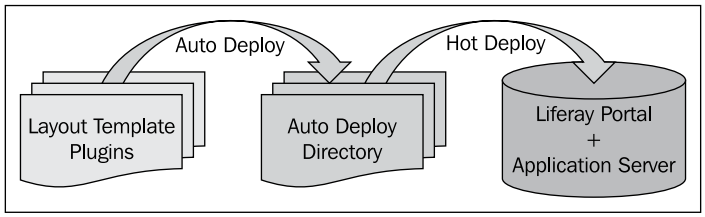
In the folder `/_diffs/css`, create a CSS file `custom.css`. We should place all of CSS that is different from the other files. By placing custom CSS in this file, and not touching the other files, we can be assured that the upgrading of their theme later on will be much smoother. In the folder `/_diffs/images`, put all customized images with subfolders. For example, create two images: `screenshot.png` and `thumbnail.png`, to record what a page with current theme looks like. And furthermore, create a subfolder `searchbar`, and put all search-related images in this folder `/searchbar`.

In the folder `/_diffs/javascript`, create a JavaScript file `javascript.js`. Liferay portal includes the YUI Library. Thus in the theme, we can include any plugins that YUI supports. In the folder `/_diffs/templates`, create customized template files (for Velocity, it is `*.vm` files; for FreeMarker, it is `*.ftl` files), such as `dock.vm`, `init_custom.vm`, `navigation.vm`, `portal_normal.vm`, `portal_pop_up.vm`, and `portlet.vm`. Note that you can use JSP files in template files under the folder `templates`. However, you won't have access to the velocity variables if JSP files were in use.

Developing user interface through layout templates development framework

Layout Templates are ways of choosing how portlets will be arranged on a page. Layout templates are usually a grid-like structure, and most often, are created with HTML tables. They make up the body of page, the large area where portlets are dragged and dropped to create pages. In a word, a layout template describes how various columns and rows are arranged to display the portlets. In brief, layout template controls the visual structure of pages in the portal.

As shown in following figure, the Plugins SDK provides an environment for developers to build layout templates, similar to that of portlets and webs. It uses the Ant target Deploy or Maven to form WAR file and copy it to the `Auto Deploy` directory first. Then the portal will detect if there are any WAR files in the auto hot-deploy folder, and automatically extract the WAR files into an application server deployment folder.



Note that both WEB and WAP got supported in layout templates. A layout template plugin should include at least two files: a file called `.tpl` for WEB and a file `.wap.tpl` for WAP. The WEB version specifies the arrangement of portlets in a page in web browsers; while the WAP version specifies the arrangement of portlets in a page of WAP devices.

Alloy UI customization

Alloy UI is a user interface meta-framework, providing a consistent and simple API for building web applications across all three levels of the browser: structure, style, and behavior. In brief, Alloy UI is a user interface web application framework, a unified UI library on top of the revolutionary YUI3, and a library of tools. Its purpose is to help make building and designing web applications and enjoyable experience.

Structure - HTML 5

Alloy UI is built based on HTML5's structure, providing reusable mark-up patterns modular. HTML5 is being developed as the next major revision of **HTML** (**HyperText Markup Language**), the core markup language of the World Wide Web. HTML5 is the proposed next standard for HTML 4.01, XHTML 1.0, and DOM Level 2 HTML. It aims to reduce the need for proprietary plugin-based **Rich Internet Application** (**RIA**) technologies such as Adobe Flash, Microsoft Silverlight, Apache Pivot, and Sun JavaFX. In brief, HTML5 incorporates Web Forms 2.0, another WHATWG (Web Hypertext Application Technology Working Group) specification.

HTML5 introduces a number of new elements and attributes that reflect typical usage on modern websites. Some of them are semantic replacements for common uses of generic block `<div>` and inline `<span>` elements, for example, `<nav>` website navigation block and `<footer>` representing bottom of web page or last lines of HTML code. Other elements provide new functionality through a standardized interface, such as the `<audio>` and `<video>` elements.

HTML5 will also have a significant impact on Search Engine Optimization (SEO) as Liferay is going to add value to entire sections of content as strong and emphasis elements. In this case, content would be translated to accurate, relevant, and pinpointed search results.

In brief, HTML5 is a new version of HTML, which addresses the new challenges we face in modern web development. It covers everything from writing web applications and maintaining sanity, to creating more distinguished content using shiny new elements, acknowledging the huge accessibility advances and opportunities available in HTML5, and offering the future of web media using Video, Audio, and Canvas.

All of the mainstream browsers are going to support this new HTML5. For example, Chrome, Safari, Firefox, and Opera have been supporting much of HTML5, and Microsoft will have "all in" in IE9. Older Internet Explorer versions can support the structural markup of these new elements with an enabling script.

Style—CSS 3

Cascading Style Sheets (**CSS**) is a style sheet language used to describe the presentation semantics (that is, the look and formatting) of a document written in a markup language. It's the most common application to style web pages written in HTML and XHTML, but the language can also be applied to any kind of XML document, including SVG and XUL.

CSS level 3 (CSS3) is modularized. It is both more compact and richer in semantics. The mark-up in the published texts of CSS is also not exactly the same as the mark-up that the authors used when writing the text. The CSS3 has abbreviations that are expanded automatically before a document is published. For example, the authors almost never create links. Instead, they include a tag or a special character that indicates the role of a word, such as a property name, a technical term or a bibliographic reference, and each such word is automatically linked to its definition.

Behavior—YUI 3

The **Yahoo**! **User Interface Library** (**YUI**) is an open-source JavaScript library for building richly interactive web applications using techniques such as Ajax, DHTML, and DOM scripting. In addition, YUI includes several core CSS resources.

YUI 3 is Yahoo!'s next-generation JavaScript and CSS library. The YUI 3 Library has grown to include the core components, a full suite of utilities, the Widget Infrastructure, and a few Widgets.

YUI 3 ships with a lot of examples that illustrate the implementation of its components. The examples can be starting points for your exploration, code snippets to jump-start your own programming, or simply inspiration as to how various interaction patterns can be enabled in the web browser via YUI.

YUI modules cover a number of modules including, but not limited to: `align-plugin`, `anim`, `async-queue`, `attribute`, `base`, `cache`, `classnamemanager`, `collection`, `console`, `console-filters`, `cookie`, `dataschema`, `datasource`, `datatype`, `dd`, `dom`, `dump`, `event`, `event-custom`, `event-simulate`, `gallery-formmgr`, `history`, `imageloader`, `intl`, `io`, `json`, `loader`, `node`, `node-focusmanager`, `node-menunav`, `oop`, `overlay`, `plugin`, `pluginhost`, `profiler`, `querystring`, `queue-promote`, `shim-plugin`, `slider`, `sortable`, `stylesheet`, `substitute`, `swf`, `swfdetect`, `tabview`, `test`, `widget`, `widget-anim`, `widget-parent`, `widget-position`, `widget-position-align`, `widget-position-constrain`, `widget-stack`, `widget-stdmod`, `yui`.

Forms

The Alloy UI Forms are a great tool to help developers build very nice forms really fast. These are some of the advantages of using these forms:

- **Usability**: Styling of the forms for a better usability;
- **Unified styling**: All the forms look the same and are controlled in one place

- **Dynamic attributes**: Any attribute that can be used for an HTML tag can also be used for an `aui` tag. For example, you could use `onClick`, `onChange`, `onSubmit`, `title`, and so on in any `aui:form`, `aui:select`, `aui:input` and it will provide the same behavior as if you use it as a plain HTML form, select or input.

These are a set of Alloy UI tags and some attributes that can be used in `aui` forms. They all support dynamic attributes, that is, you can add any additional attributes. For example, if you add the attribute `onFocus` to an aui:button in an `aui` form, the tag `<button>` will have the `onFocus` attribute.

Alloy UI forms is a set of taglibs built on top of the Alloy UI, that is, JavaScript plus CSS, framework. Alloy UI forms (`aui`) provide following tags, but are not limited: `Form`, `Field-set`, `Button`, `Button Row`, `Model Context`, `Input`, `Select`, `Option`, `Link (a)`, `Field Wrapper`, `Legend`, `Layout`, `Column`, `Other Examples`, `Text-area`, `Radio`, and so on.

Alloy UI covers many modules as follows `aui-autocomplete`, `aui-button`, `aui-calendar`, `aui-char-counter`, `aui-color-picker`, `aui-component`, `aui-datatype`, `aui-delayed-task`, `aui-dialog`, `aui-editable`, `aui-event`, `aui-image-viewer`, `aui-io`, `aui-live-search`, `aui-loading-mask`, `aui-nested-list`, `aui-node`, `aui-overlay`, `aui-paginator`, `aui-panel`, `aui-parse-content`, `aui-portal-layout`, `aui-rating`, `aui-resize`, `aui-textboxlist`, `aui-toolbar`, `aui-tooltip`, `aui-tree`, and so on.

More useful information

In this chapter, we have looked at what Liferay can do for your corporate intranet, and briefly seen why it's a good choice.

If you want more background information on Liferay, the best place to start is the Liferay corporate website (`http://www.liferay.com`) itself. You can find the latest news and events, various training programs offered worldwide, presentations, demonstrations, and hosted trails. More interestingly, Liferay eats its own dog food; corporate websites within forums (called message boards), blogs, and wikis are built by Liferay using its own products. It is a real demo for the Liferay portal.

Liferay is 100 percent open source and all downloads are available from Liferay portal website (`http://www.liferay.com/web/guest/downloads/portal`) and SourceForge website at `http://sourceforge.net/projects/lportal/files`. The source code repository is available at `svn://svn.liferay.com/repos/public` (use the username "Guest" and no password) and source code can be explored at `http://svn.liferay.com`.

Liferay website wiki (`http://www.liferay.com/web/guest/community/wiki`) contains documentation such as tutorial, user guide, developer guide, administrator guide, roadmap, and so on.

Liferay website discussion forums can be accessed at `http://www.liferay.com/web/guest/community/forums` and the blogs at `http://www.liferay.com/web/guest/community/blogs`. The road map can be found at `http://www.liferay.com/web/guest/community/wiki/-/wiki/Main/RoadMap`. The official plugins are available at `http://www.liferay.com/web/guest/downloads/official_plugins`.

The community plugins available at `http://www.liferay.com/web/guest/downloads/community_plugins` are the best place to share your thoughts, to get tips and tricks about Liferay implementation, to know about the road map, and to use and contribute community plugins.

If you would like to file a bug or know more about the fixes in a specific release, then you must visit the bug tracking system at `http://issues.liferay.com/`.

Alloy UI Forms is a set of taglibs built on top of the Alloy UI framework. For more information about the framework you can visit: `http://alloy.liferay.com`. CSS3, CSS level 3, is available at `http://www.w3.org/Style/CSS/current-work`. A detailed description of HTML5 is available at `http://dev.w3.org/html5/spec/Overview.html`.YUI 3 is Yahoo!'s next-generation JavaScript and CSS library and you can find out more at `http://developer.yahoo.com/yui/3/`.

Summary

In this chapter, we have looked at what Liferay can offer your intranet and the Internet. Particularly, we saw:

- That Liferay portal will provide shared documents, discussions, collaborative wikis, and more in a single, searchable portal
- That Liferay is a great choice for intranets and Internets, it's easy to use, it's free and open source, extensible, and well integrated with other tools and standards
- The plugins SDK that can provide user interface development and customization environments for ext, themes, layout templates, webs, portlets, and hooks
- The various pages on `liferay.com` that can provide us with more background information

In the next chapter, we're going to introduce basic theme development.

2
Basic Theme Development

Liferay Portal is a standards-compliant portal server. The presentation layer of a Liferay-based portal application includes three major parts: data rendered through portlets, a theme that controls the general user interface (look and feel) of portal pages generated by Liferay, and layout templates that control the structures of portal pages.

A Liferay theme is basically a user interface component to make the portal application more user-friendly and visually appealing. It typically includes CSS, images, JavaScript, and Velocity or Freemarker templates and is packaged as a **Web ARchive** (**WAR**) file for distribution and deployment.

Multiple themes can be deployed on a Liferay Portal server for users with appropriate permission to choose from. A theme can be applied to all sites running on the same portal server as the default regular theme. For example, by default all users see the same default Liferay 'Classic' theme for all sites. A theme can also be applied to all public or private pages of any particular site, or any particular page of a site.

Liferay Portal provides some tools for theme designers and developers to build new themes or update existing themes. This chapter explains how you can use the right tools to completely customize the look and feel of any Liferay-based portal application to meet your own design.

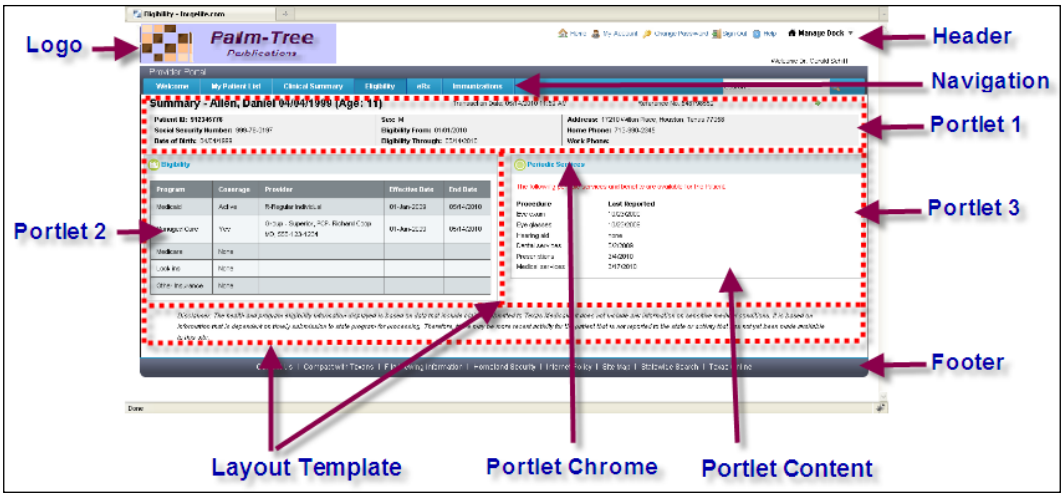
By the end of this chapter, you will have learned:

- The basic structure of a Liferay portal page
- Setting up Liferay plugins SDK for plugin development
    - Recommended tools
    - Downloading and installing Liferay files

- How to build your own theme
    - Creating your own build properties
    - Creating a new theme skeleton
- AlloyUI
    - Cascading Style Sheets: From CSS 2.1 to CSS3
    - JavaScript: From JQuery to YUI3
    - HTML5
- Images
- Velocity templates
    - Basic skeleton of themes
- Pop-up Windows
- Updating the theme with your own files
    - Changing the configuration to enable developer mode
    - Modifying the generated files
    - Adding your own theme files to subfolders of `_diffs` folder
- Building the theme as WAR File and deploying it
    - Packaging the theme as WAR File
    - Hot deployment of the theme

The basic structure of a Liferay Portal page

A typical Liferay Portal page includes components such as a header (with or without a logo), navigation menus (either horizontal or vertical navigation menus, or both), one or multiple portlets in the portlet display area, and footer. Starting with Liferay Portal 6, signed in users will also notice that a DockBar tool, which can be turned off, at the very top of a portal page. These components are constructed in Liferay theme. The layout template is not part of a theme but works with theme together to control the overall look and feel of the generated portal page. The following diagram shows the anatomy of a portal page structure:



Now we understand the high level components of a portal page. The next question is how we can leverage some existing tools to customize these components and create an appealing portal application?

Fortunately, Liferay Portal provides Liferay Plugins SDK for designers and developers to create or modify different Liferay plugins including ext (starting in Liferay 6.0 only), hooks, layout templates, portlets, themes, and webs. Liferay IDE, which will be covered a little more in *Chapter 5*, *Advanced Theme*, is also available as an Eclipse plugin so developers who are used to Eclipse IDE can take advantage of this nice tool in the theme development.

Setting up Liferay Plugins SDK for plugin development

Liferay Portal is a Java-based open source enterprise web platform for building portal solutions. It supports open standards with a very flexible architecture. Its deployment support matrix covers hundreds of different combinations of hardware, operating systems, application servers or servlet containers, relational databases, and integrations with third-party applications.

To make the explanation simpler, the following development environment is used across this book. Of course, you can use other operating systems or different versions of the appropriate software.

- Windows XP or Windows 7
- Jdk1.6.0_16

- Apache Ant 1.8.1
- Liferay Portal CE 6.0 bundled with Tomcat 6.0.26
- Liferay Plugins SDK 6.0
- Liferay IDE 1.1 (optional)
- MySQL Community Server 5.1
- Eclipse with SVN client and Quantum DB plugins
- Subversion for source control

Recommended tools

JDK

It is recommended that you install Sun (Oracle) JDK 1.6 in your local file system and set `JAVA_HOME` system environment attribute as follows:

```
JAVA_HOME=C:\Software\Java\jdk1.6.0_16
```

You also need to add `%JAVA_HOME%\bin`; to the beginning of your Windows system environment path setting. You can check your settings by running the command `java -version` or `echo %JAVA_HOME%` for Windows or `echo $JAVA_HOME` for Linux.

Based on your operating system, you might need to download and install JDK 64-bit for development environment.

Ant

Apache Ant is a Java library and command line tool that help building software. The out-of-box Liferay Plugins SDK uses Ant for compiling and packaging plugins such as portlets, themes, and layout templates. You need to install Ant in your local folder and set `ANT_HOME` system environment attribute such as:

```
ANT_HOME=C:\Software\apache-ant-1.8.1
```

You also need to add `%ANT_HOME%\bin`; to the beginning of your Windows system environment PATH setting. You can check your settings by running the command `ant -version` or `echo %ANT_HOME%` for Windows or `echo $ANT_HOME` for Linux.

Maven

Maven is a high level, intelligent project management, build and deployment tool provided by Apache's software foundation group. It deals with application development lifecycle management. The widely used version is Maven2.

Ant is simply a toolbox whereas Maven is entirely different. It is about the application of patterns in order to achieve an infrastructure which displays the characteristics of visibility, reusability, maintainability, and comprehensibility.

Liferay community is working on official maven artifacts for Liferay Portal as well as porting Liferay Plugins SDK to Maven. Maven support is provided in Liferay Portal 6. The high level configuration steps include:

- Installing a maven proxy/repository
- Configuring Maven settings in your `$HOME/.m2/settings.xml`
- Installing Liferay artifacts to repository
- Installing the Liferay Maven SDK
- Creating a plugin
- For more details, please refer to the following blog and wiki pages:

  `http://www.liferay.com/web/mika.koivisto/blog/-/blogs/liferay-maven-sdk`

  `https://www.liferay.com/community/wiki/-/wiki/Main/Maven+SDK`

Eclipse

Eclipse Galileo or Helios is downloaded and installed locally, such as under `C:\Software\eclipse` in Widows.

Liferay IDE

The development of Liferay theme can be challenging and time consuming, especially for those who are not familiar with the Liferay theme architecture and elements.

After introducing in Liferay Portal 6.0, Liferay IDE has been introduced to provide Eclipse tooling for Liferay Portal development platform. This Ecplise Plugin supports Windows XP/Vista/7, Linux, and Mac OS X 10.5 or higher. It makes common and trivial tasks easier and allows some to be automated during the development, deployment, and debugging of Liferay Plugins. Please refer to *Chapter 5* to find out more details.

Other Eclipse Plugins

An Eclipse Plugin allows Liferay theme engineers to quickly create or modify Liferay themes. SVN and Quantum DB plugin for Eclipse are recommended for plugin development.

Downloading and installing Liferay files

To set up a Liferay development environment, we need to have a running Liferay Portal and Liferay Plugins SDK. It is also highly recommended that you download Liferay Portal source codes for reference.

All related files can be downloaded from SourceForge website at `http://sourceforge.net/projects/lportal/files/Liferay%20Portal`

This book is targeted at Liferay Portal 6.0 or later versions, so please download the right version to start with. Also, make sure all three components are for the same version.

Creating a common workspace folder

Now create a workspace folder in your local environment such as `C:\workspace_6.0.5_book` in Windows. Save your Liferay Portal bundles, Liferay Plugins SDK, and Liferay Portal source codes as three subfolders in this same workspace directory.

You can also install these components in different folders but need to make sure you update your environment such as `build.{your.username}.properties`, which will be explained later in this chapter, to reflect your own installation.

Liferay Portal bundle

If you have not installed Liferay Portal 6.x yet, you can download the Tomcat bundle, unzip it, and save the files under bundles in your newly created workspace. This bundles folder is referred to as `${liferay.bundles.home}` in this book.

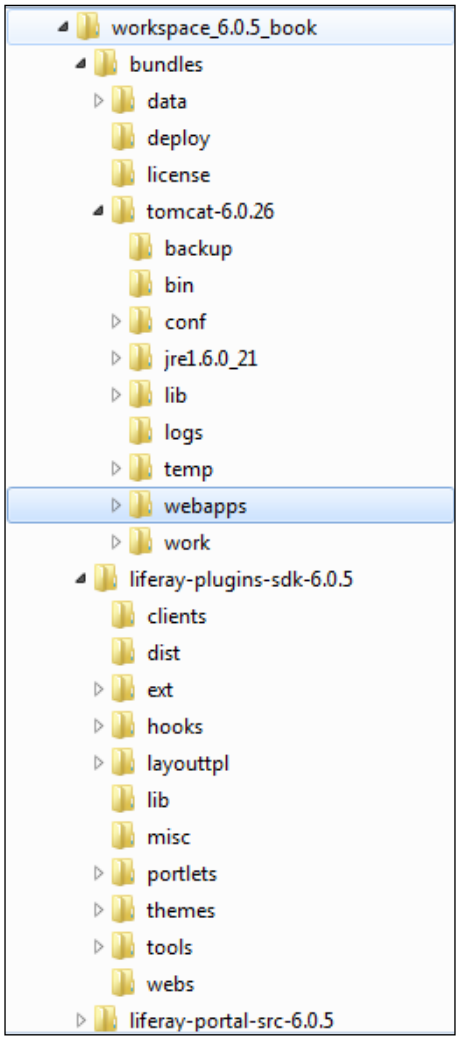
Liferay Plugins SDK

Download Liferay Plugins SDK, unzip it, and save the files under `liferay-plugins-sdk-{version.number}` in your newly created workspace. This folder is referred to as `${liferay.plugins.sdk.home}` in this book.

Liferay Portal source codes

Download Liferay Portal source codes, unzip it, and save the files under `liferay-portal-src-{version.number}` in your newly created workspace. This folder is referred to as `${liferay.portal.src.home}` in this book.

You should have a folder structure similar to what is displayed in the following screenshot:



Database configuration

It is necessary to have a database in order to install and run Liferay Portal. By default, Liferay Portal uses a built-in **HyperSQL Database** (**HSQLDB**), which is good enough for some theme engineers because there is not much direct interaction with the database when a theme is developed.

To build a more stable development environment, particularly if you are a portlet engineer as well, you might want to use your preferred relational database to replace HSQLDB. A local installation of MySQL community edition 5.1 is used in this development environment. To change Liferay's database, please follow the configuration steps below:

1. Install MySQL database, if this has not been done yet.
2. Create a new empty database named `lportal` for your Liferay installation.
3. Open a command prompt or Windows Explorer.
4. Go to `${liferay.bundles.home}\tomcat-6.0.26\webapps\ROOT\WEB-INF\classes\` folder.
5. Create `portal-ext.properties` file.
6. Add the following MySQL configuration to this file and save the change:

```
#
# MySQL

jdbc.default.driverClassName=com.mysql.jdbc.Driver
jdbc.default.url=jdbc:mysql://localhost/lportal?useUnicode=true&ch
aracterEncoding=UTF-8&useFastDateParsing=false
jdbc.default.username=<<put your database username here>>
jdbc.default.password=<<put your database password here>>
```

Please note that the previous database configuration is for a Liferay Portal database name `lportal`. Change it to your own database name, if it is different. You need to add the login credentials for a database administrator in your MySQL. If you use another database such as Oracle, you need to set up the configuration differently in this same file. For more details, please refer to Liferay Portal administration guides.

Starting Liferay Portal

Start Liferay Portal by running `${liferay.bundles.home}\tomcat-6.0.26\bin\startup.bat|.sh`. Log in to the default URL at `http://localhost:8080/` with username and password: `bruno@7cogs.com` and bruno.

You can log in as `test@liferay.com` and test if you have un-deployed the sevencogs-hook from `${liferay.bundles.home}\tomcat-6.0.26\webapps` directory. Please note that the Tomcat version might be different from 6.0.26 so you will need to refer to your Tomcat version accordingly.

How to build your own theme

Now you have set up Liferay Plugins SDK for your theme development. It is time to take action to build a simple one.

Creating your own build properties

In order to overwrite the default configurations of the build properties, you need to create your own build properties before you compile your plugins such as portlets and themes. This can be done by following the steps given here:

- Find out your current username on your operating system. On Windows, you can run the command `echo %username%` in command prompt console. Please note that the username is case-sensitive.
- Go to the `${liferay.plugins.sdk.home}` folder; for example `C:\workspace_6.0.5_book\liferay-plugins-sdk-6.0.5`.
- Copy `build.properties` and rename it to `build.${your.username}.properties` such as `build.frank.properties`.
- By default, Liferay Plugins SDK supports Tomcat in the bundles folder (for example `C:\workspace_6.0.5_book\bundles\tomcat-6.0.26`). You need to modify the default settings in `build.${your.username}.properties` if you use another application server or servlet container, or use Tomcat installed in a different folder. For example, you will need to change the following lines to point to your own application server or Tomcat installation directory, if you don't use the Tomcat in the default bundles folder:

```
#
# Specify the paths to an unzipped Tomcat bundle.
#
app.server.type=tomcat
app.server.dir=${project.dir}/../bundles/tomcat-6.0.26
app.server.deploy.dir=${app.server.dir}/webapps
app.server.lib.global.dir=${app.server.dir}/lib/ext
app.server.portal.dir=${app.server.dir}/webapps/ROOT
```

Creating a new theme skeleton

Now you have installed Liferay Portal and set up Liferay Plugins SDK as a development environment. You can start building your own theme. As an example, we are going to show you how to build a *Palm Tree Publications* theme from scratch.

Running Liferay Plugins SDK to create the theme skeleton

The Liferay Plugins SDK provides a script file to create the skeleton of a new theme.

Better use of command prompt on Windows

If you use Windows XP and haven't done so yet, it is recommended that you add command prompt to your Windows Explorer right-click menu, so that you can go to the desired file folder by right-clicking your target folder and choose command prompt. Otherwise, you need to open command prompt and change directory to your target folder every time.

If you use Windows 7, the command prompt is available in your Windows Explorer right-click menu. You can press and hold *Shift*, then right-click on a folder that you want to open the command prompt for and click on **Open Command Prompt Here** option.

Now navigate to `${liferay.plugins.sdk.home}/themes` folder and run create script as follows:

For Windows:

```
create <theme-name> "<theme simple description>"
```

For Unix/Linux/Mac:

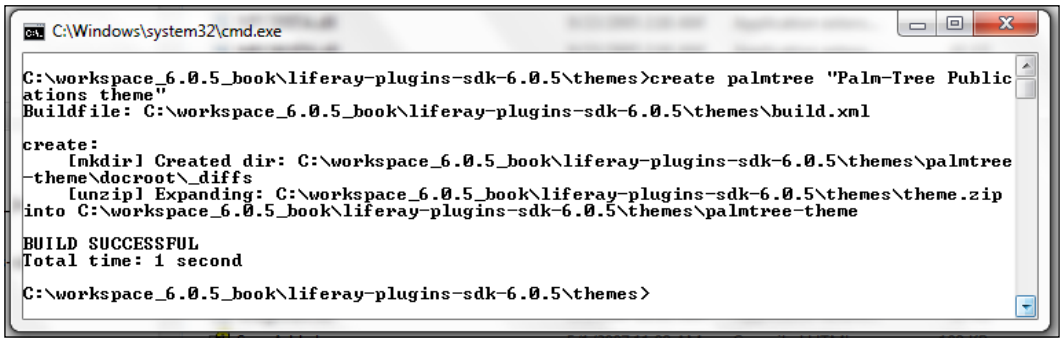
```
./create.sh <theme-name> "<theme simple description>"
```

Please make sure that the `create.sh` file is executable before you run the given command.

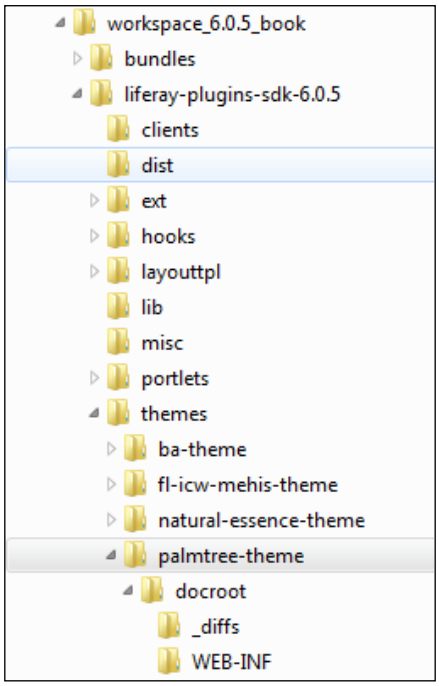
Where < theme-name> is the theme folder name, which should not contain empty space in the name, within the file structure, and <theme simple description> is the text that will actually be displayed in the **Available Themes** list within Liferay Portal. The second parameter must have quotes around it to allow spaces in the description of the theme. For example, the following command will create the *Palm-Tree Publications* theme on Windows:

```
C:\workspace_6.0.5_book\liferay-plugins-sdk-6.0.5\themes>create palmtree
"Palm-Tree Publications Theme"
```

The following screenshot shows a **BUILD SUCCESSFUL** message:



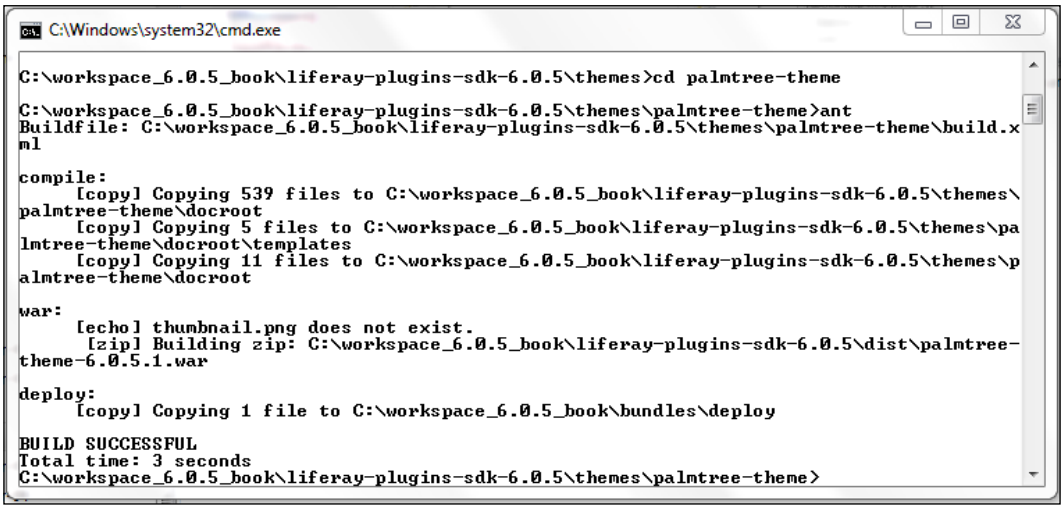
Now you can go to your Windows Explorer and notice that a theme folder named `palm-tree-publications-theme` has been created automatically under `${liferay.plugins.sdk.home}/themes` folder. The theme's folder name is the same as the theme name with `-theme` appended to the end of the theme name. It has the following theme skeleton, as highlighted in the next screenshot:



Building and deploying the generated theme as WAR file

You can run the `ant` command to build the generated theme.

1. Open Windows command prompt and go to `${liferay.plugins.sdk.home}/themes/palm-tree-publications-theme/`
2. Run ant task command `ant clean` to clean up the previously generated files by ant tasks, if any.
3. Run ant task command `ant` to build the theme as WAR file.
4. Please note that the `ant` command calls the default `deploy` task defined in `${liferay.plugins.sdk.home}/build-common-plugin.xml`. As shown in the next screenshot, this process takes the following actions:
    - Compiles the theme and copies many CSS, images, JavaScript, and velocity templates including `init_custom.vm`, `navigation.vm`, `portal_normal.vm`, `portal_pop_up.vm`, and `portlet.vm` from Liferay Portal to corresponding subfolders of `palm-tree-publications-theme\docroot` folder
    - Packages the theme in a WAR format
    - Copies the packaged `theme WAR file` to `${liferay.bundles.home}/deploy` folder for hot deployment



Now you can go back to the theme's `docroot` folder and notice the following folder structure and files:

```
${your.theme.name}-theme/docroot
  _diffs
  css
          application.css
          base.css
          custom.css
          dockbar.css
          extras.css
          forms.css
          layout.css
          main.css
          navigation.css
          portlet.css
  images
      (multiple directories of images)
      js
         main.js
  templates
          init_custom.vm
          navigation.vm
          portal_normal.vm
          portal_pop_up.vm
          portlet.vm
  WEB-INF
        liferay-plugin-package.properties
```

You can also notice that the theme has been packaged as a WAR file that is `palm-tree-publications-theme-{version.number}.war`, where the first part of `{version.number}` that is 6.0.5.1 is configured in `lp.version` property in your build properties file `${liferay.plugins.sdk.home}/build.{your.username}.properties`. This WAR file is saved in `${liferay.plugins.sdk.home}/dist` folder for distribution. The same WAR file has also been copied to `${liferay.bundles.home}/deploy` folder for hot deployment in Tomcat. If Liferay Portal is up and running already or will be started, `${liferay.bundles.home}/deploy/palm-tree-publications-theme-{version.number}.war` will be hot deployed in Liferay. You can verify the theme by logging in as a portal administrator, apply this theme to a page, and verify the UI of the generated theme.

AlloyUI

If you open some of the generated files in your theme, you will notice that some codes are not available in the previous version (pre-6.0) of Liferay Portal.

For example, you will notice the following codes:

- Some CSS3 definitions such as `border-radius` and `box-shadow` codes in `${liferay.plugins.sdk.home}/themes/palm-tree-publications-theme/docroot/css/extras.css`
- Some HTML5 element tags such as `<header>` and `<footer>` in `${liferay.plugins.sdk.home}/themes/palm-tree-publications-theme/docroot/templates/portal_normal.vm`
- `AUI().ready` in `${liferay.plugins.sdk.home}/themes/palm-tree-publications-theme/docroot/js/main.js` file instead of `jQuery(document).ready`, as in pre-6.0 version of Liferay Portal.

You might wonder what happened to the UI of Liferay Portal 6.x because these codes were not available in the previous versions of Liferay Portal. This is due to the introduction of Alloy UI, since Liferay Portal 6.0.

Alloy UI is a major new feature introduced in Liferay Portal 6.0. According to `http://alloy.liferay.com`, Alloy is a UI meta-framework that provides a consistent and simple API for building web applications across all the three levels of the browser—structure, style, and behavior. It takes common design patterns and makes them easier to implement. With Alloy UI framework, Liferay developers need to spend less time designing and more time creating usable plugins with usable interfaces. These visual elements are available for common interface elements in Liferay Tag libraries.

Alloy UI framework is built on top of CSS3 and **Yahoo! User Interface Library** (**YUI3**). It also supports many of the HTML5 conventions. This gives the UI developers freedom to design the portal in the upcoming W3C standard.

Cascading Style Sheets – From CSS 2.1 to CSS3

Liferay Portal 6.0 replaces CSS 2.1 with CSS 3. CSS3 specification is split up into **modules**. Some of these modules include:

- **Borders**: This module helps create visually appealing boxes such as rounded border, colored borders, gradient border, box with a shadow, and box with repetitive images as border.

- **Backgrounds**: CSS3 provides the ability to specify in terms of percentage or pixels how large a background image should be, to use multiple backgrounds, and to specify how the position of a background is calculated.
- **Color**: Traditionally, people used colors in CSS with either the hexadecimal format, which looks like `#AABBCC`, or the RGB format, which looks like RGB(120,100,200). CSS3 comes with several new ways of manipulating colors such as using HSL (Hue, Saturation, Lightness) and opacity/alpha-channels. Unfortunately, the CSS3 elements are not supported by all major browsers yet. For example, Microsoft Internet Explorer does not support CSS3 elements until IE 9.
- **Text effects**: This module in CSS3 enhances the already reasonably versatile text effects and removes some of limitations in CSS2. It makes it much easier to add some of the text effects such as text shadow, word wrapping, and web fonts. These features enhance the typographic layout of the page.
- **User interface**: CSS3 brings some great new properties relating to resizing elements, cursors, outlining, box layout and sizing, and more.
- **Multi-Column Layout**: This module allows the designer to specify how many columns text should be split down into and how they should appear.
- Other modules include Selectors, Generated Content, Media Queries, and Speech, and so on.

CSS3, obviously, is completely backwards compatible, so it is not necessary to change existing designs to ensure that they work – web browsers will always continue to support CSS2.

JavaScript – From jQuery to YUI3

As of versions 4.x and 5.x, Liferay Portal uses jQuery as its base JavaScript framework. jQuery uses the concept of CSS selectors such as `#banner` or even `body > #wrapper` to match a set of elements in a document or grab elements on a page and manipulate them.

The previous versions of Liferay Portal used jQuery in *no conflict* mode. By default, jQuery is assigned to the `$` variable, which is how you will see it referenced in the jQuery documentation. However, when in *no conflict* mode, the `$` is not used as it may cause conflict with other libraries that use the same variable. In this mode you should use `jQuery('.selector')` instead of `$('.selector')`.

Liferay Portal uses lots of drag and drop features. These features are implemented in jQuery in the previous versions of Liferay Portal.

From version 6.0, Liferay Portal stopped using jQuery in the built-in portlets and plugins, and instead started building everything on top of Alloy UI, which is based on CSS3 and YUI3.

In addition to jQuery, there are numerous other JavaScript libraries available. One of the most widely asked questions in the Liferay community is why Alloy UI is based on top of YUI3. According to Nate Cavanaugh, the director of Liferay User Interface Engineering, YUI3 can help build JavaScript utilities and widgets in a much faster way, provide better documentations, and resolve some real problems ranging from a small scale to a large scale, among other benefits.

As the default JavaScript platform in multiple versions before Liferay Portal 6.0, jQuery has been heavily used in many existing Liferay-based portal applications, including many enterprise portal solutions. The next question is what happens to the support of jQuery in Liferay Portal 6.x.

Liferay Portal 6.x doesn't include jQuery library in the product package. Therefore, there is no out-of-box jQuery support. This means that any jQuery-based portlets and themes will not be fully functional without custom migration efforts. Fortunately, you can package the right version of jQuery library in your portlet or theme WAR file, and include the library in your application include path. If you have multiple WAR files to consume the library, you need to find a better way to share the same library across these WAR files. The detailed instructions on how to support jQuery in your own theme and portlets will be provided in *Chapter 5* and *Chapter 10*.

HTML5

Some of the basic elements that have been added in HTML5 include semantic replacements for common uses of generic block and inline elements. Other elements work with standardized interface such as `<audio>` and `<video>` elements. Some other elements such as `<font>` and `<centers>` have been dropped from HTML5 because they are now achieved using CSS. HTML syntax is no longer based on **Standard Generalized Markup Language** (**SGML**). Instead, it now comes with a new introductory line that is similar to SGML document type declaration, allowing standards-compliant rendering in all browsers that use DOCTYPE sniffing (or DOCTYPE switching), a process by which a browser chooses a rendering mode, based on the DOCTYPE declaration.

Liferay Portal 6.x supports HTML5 and includes the following DOCTYPE as the very first line in its default theme. It also includes other HTML5 elements such as `<header>` and `<footer>`.

```
<!DOCTYPE html>
```

Images

When a theme is built and packaged, some images are copied from Liferay into the new theme's `/docroot/images` folder and its subfolders. These images are used in the overall portal UIs and many of the out-of-box Liferay portlets.

Velocity templates

Apache Velocity is an open source template engine. It permits the users to use a simple yet powerful template language to reference objects defined in the Java code. It is written in 100% pure Java and can be easily embedded into your own applications. Velocity templates help for cleaner code and better maintainability.

Velocity templates control the different HTML of the portal. With the combination of HTML and Velocity you can restructure how the HTML is served.

As explained earlier in this chapter, the following velocity templates are copied from Liferay to your theme's `/docroot/templates` folder:

- `init_custom.vm`: This file allows you to override and define new velocity variables.
- `navigation.vm`: This file is called by `portal_normal.vm` and provides the HTML to make the navigation menus.
- `portal_normal.vm`: This file controls the basic skeleton HTML of the page that Liferay will serve.
- `portal_pop_up.vm`: This file controls the layout of portal templates for pop-up notifications.
- `portlet.vm`: This file wraps the content of every portlet.

Before you start customizing your theme templates, you might want to have a good understanding about these templates, particularly `portal_normal.vm` where you can define the structure of your theme.

Basic skeleton of themes

The file `portal_normal.vm` controls the basic skeleton of theme. The following source code from the default theme shows the details of this file from Liferay Portal 6.0:

```
<!DOCTYPE html>
#parse ($init)
<html dir="#language("lang.dir")" lang="$w3c_language_id">
<head>
```

```
  <title>$the_title - $company_name</title>
  $theme.include($top_head_include)
</head>

<body class="$css_class">

#if($is_signed_in)
  #dockbar()
#end
<div id="wrapper">
  <a href="#main-content" id="skip-to-ontent">#language("skip-to-
content")</a>
  <header id="banner" role="banner">
    <hgroup id="heading">
      <h1 class="company-title">
        <a class="logo" href="$company_url" title="#language("go-to")
$company_name">
          <span>$company_name</span>
        </a>
      </h1>
      <h2 class="community-title">
        <a href="$community_default_url" title="#language("go-to")
$community_name">
                    <span>$community_name</span>
                </a>
            </h2>
            <h3 class="page-title">
                <span>$the_title</span>
            </h3>
        </hgroup>
        #if(!$is_signed_in)
            <a href="$sign_in_url" id="sign-in" rel="nofollow">$sign_
in_text</a>
        #end
        #if ($update_available_url)
            <div class="popup-alert-notice">
                <a class="update-available" href="$update_available_
url">#language("updates-are-available-for-liferay")</a>
            </div>
        #end
        #if ($has_navigation)
            #parse ("$full_templates_path/navigation.vm")
        #end
    </header>
```

```
    <div id="content">
        <nav class="site-breadcrumbs" id="breadcrumbs">
            <h1>
                <span>#language("breadcrumbs")</span>
            </h1>

      #breadcrumbs()
    </nav>
    #if ($selectable)
      $theme.include($content_include)
    #else
      $portletDisplay.recycle()
      $portletDisplay.setTitle($the_title)

      $theme.wrapPortlet("portlet.vm", $content_include)

    #end
  </div>
  <footer id="footer" role="contentinfo">
    <p class="powered-by">
      #language("powered-by") <a href="http://www.liferay.com"
rel="external">Liferay</a>
    </p>
  </footer>

</div>
</body>
$theme.include($bottom_include)
</html>
```

Now let's take a closer look at this file.

HTML5 DOCTYPE

This file starts with `<!DOCTYPE html>`, which is a new DOCTYPE in HTML5 and significantly simpler than most DOCTYPEs that you might have seen. What's really nice about this new DOCTYPE is that all current browsers, such as Internet Explorer, FireFox, Opera, Safari, and Google Chrome will look at it and switch the content into standards mode, even though they don't implement HTML5. This means that you could start writing your web pages using HTML5 today and have them last for a long time.

Parsing template initialization file

The `#parse ($init)` code processes the template initialization file `${PORTAL_ROOT_HOME}/html/themes/_unstyled/templates/init.vm`. This initializes variables and properties needed for your theme and the portlets that use this theme.

HTML document structure elements

You can see that this `portal_normal.vm` generates the basic web page skeleton, including the HTML document structure elements such as:

- `<html>...</html>`: This is the *root* element that delimits the beginning and the end of an HTML document. All the other elements are contained in this root element.
- `<head>...</head>`: This is the container for processing information and metadata for an HTML document.
- `<body>...</body>`: This is the container for the displayable content of an HTML document.

CSS and JavaScript includes

The following line of code within the `<head>` and `</head>` element tags is used to include all the CSS and JavaScript definitions for the theme and portlets on each particular portal page:

```
$theme.include($top_head_include)
```

Depending on the device on which the browser is used to access the portal page, it will call either `${PORTAL_ROOT_HOME}/html/common/themes/top_head.jsp` or `${PORTAL_ROOT_HOME}/wap/common/themes/top_head.jsp` for the normal theme or wireless theme, respectively.

As a part of the performance tuning efforts, the following line of code between `</body>` and `</html>` is to include some CSS and JavaScript codes that can be loaded after the page is loaded. For example, Google Analytics and monitoring codes are included after the page is loaded this way:

```
$theme.include($bottom_include)
```

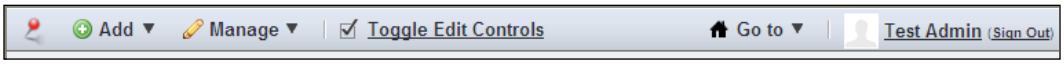
Again, depending on the device on which the browser is used to access the portal page, this includes a template called either `${PORTAL_ROOT_HOME}/html/common/themes/bottom.jsp` or `${PORTAL_ROOT_HOME}/wap/common/themes/bottom.jsp` for the normal theme or wireless theme, respectively.

Portal page DockBar

The following block of code is used to generate the DockBar for authenticated users.

```
#if($is_signed_in)
  #dockbar()
#end
```

Based on the users' permissions, the functions in this DockBar might include **Add Application**, **Manage Page**, **Go to a site**, **Sign Out** link, and so on. The following screenshot shows what is displayed on a portal page for a user with administrator permission, when this DockBar is rendered in the default Liferay Classic theme.



If you are familiar with the previous versions of Liferay Portal, you might have noticed that most of the functions in the DockBar are the same or very similar to those functionalities in DockBar in version 5.x. A new small ping option to the extreme right is to pin the topmost navigation menu, which has options **Add**, **Manage**, and **Go to**.

Header

The following is an excerpt from the generated theme's `/docroot/_diffs/templates/portal_normal.vm` file:

```
    <header id="banner" role="banner">
      <hgroup id="heading">
        <h1 class="company-title">
          <a class="logo" href="$company_url" title="#language("go-to")
$company_name">
            <span>$company_name</span>
          </a>
        </h1>
…

      #if ($has_navigation)
        #parse ("$full_templates_path/navigation.vm")
      #end
    </header>
```

As you might have noticed, this block of code is contained within HTML5 elements `<header>...</header>`

The logo of an organization or community

Each portal site (implemented as either organization or community) can have its own custom logo, which is configurable in Control Panel. The logo will be displayed in the portal header area through the following block of code:

```
<hgroup id="heading">
<a class="logo" href="$company_url" title="#language("go-to")
$company_name">
  <span>$company_name</span>
</a>
…
</hgroup>
```

When the code is executed in Liferay, part of the generated codes looks like the following part to control the display of logo as a background image for the anchor tag:

```
<style type="text/css">#heading .logo{background:url(/image/layout_
set_logo?img_id=19410&amp;t=1286516513835) no-repeat;display:
block;font-size:0;height:65px;text-indent:-9999em;width:317px;}</
style>
```

The style applied to the logo is defined in the following section in the theme's `custom.css` file:

```
#heading .logo {
  background:url("../images/logo_me.jpg") no-repeat scroll 0 0
transparent;
  display:block;
  font-size:0;
  height:65px;
  text-indent:-9999em;
  width:317px;
  margin-bottom:2px;
}
```

Navigation

Based on the design of your theme, you can include horizontal and/or vertical menus for easier navigation to different pages of your site. There could also be multiple levels of navigation menus for any particular menu item because Liferay allows the site administrator to create child or grandchild pages without limits.

The navigation menus are rendered through `navigation.vm` as called in the following block of code:

```
<header id="banner" role="banner">
  …
    #if ($has_navigation)
      #parse ("$full_templates_path/navigation.vm")
    #end
  </header>
```

A closer look at `navigation.vm` shows that navigation menus are rendered as an unordered bulleted list with CSS classes to control the look and feel of each menu.

The following screenshot shows the default Liferay logo and the horizontal navigation menus in Liferay Classic theme:

Portal content

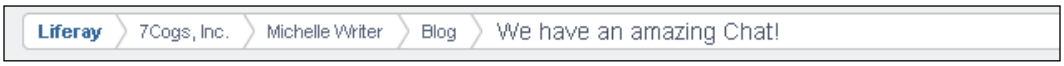
The portal application renders its data in the content area, which is through the following block of code:

```
<div id="content">
  <nav class="site-breadcrumbs" id="breadcrumbs">
    <h1>
      <span>#language("breadcrumbs")</span>
    </h1>
    #breadcrumbs()
  </nav>
  #if ($selectable)
    $theme.include($content_include)
  #else
    $portletDisplay.recycle()
    $portletDisplay.setTitle($the_title)
    $theme.wrapPortlet("portlet.vm", $content_include)
  #end
</div>
```

Global unified breadcrumb

Since version 3.5, Liferay Portal offered the Breadcrumb portlet to keep a track of how deep a user has gone into the navigation of a site. Starting in version 6.0, Liferay introduces the global unified breadcrumb as a new navigation component shown on all the pages at the top and below the navigation menu. This component replaces the old Breadcrumb portlet and is always visible on the screen when the default Classic theme is applied.

The following screenshot shows the global unified breadcrumb on the sample 7 Cogs, Inc. site.



Portlet chrome

Portal chrome is the header area of a portlet. Based on the users' permission, it might include a little icon for the portlet, the portlet title, the icon for links to **Look and Feel**, **Configuration**, **Export/Import**, a minimizing icon, a maximizing icon, and a close icon.

The following screenshot shows the chrome of Blogs portlet on the sample 7 Cogs, Inc. site:

A user with the right permissions can disable an individual portlet chrome by unchecking the Display Borders checkbox on the Portlet Configuration page.

Portlet content

The contents of portal application are rendered in individual portlets. This is done through the following block of code, to call all portlets available on each particular portal page.

```
#if ($selectable)
  $theme.include($content_include)
#else
  $portletDisplay.recycle()
```

```
        $portletDisplay.setTitle($the_title)
        $theme.wrapPortlet("portlet.vm", $content_include)
      #end
```

In addition to the portlet chrome (portlet header) area, `portlet.vm` also calls the following Velocity attribute to render the data inside each portlet:

```
$portlet_content
```

Footer

The footer of each portal page typically includes copyright and is powered by messages. The footer is rendered by the following block of code in `portal_normal.vm` file:

```
    <footer id="footer" role="contentinfo">
      <p class="powered-by">
        #language("powered-by") <a href="http://www.liferay.com"
rel="external">Liferay</a>
      </p>
    </footer>
```

Pop-up windows

The pop-up window for Liferay notification message is controlled by `portal_pop_up.vm` file, which is similar to `portal_normal.vm` but has much simpler functions.

Updating the theme with your own files

Now you know how a new theme skeleton is created with the create theme script and where the files in `css`, `images`, `javascript`, and `templates` subfolders are copied from, when `ant deploy` command is executed in Liferay Plugins SDK. You also know the structures of each Velocity template in the theme. It is time to update the theme with your own files.

Changing the configuration to enable developer mode

Liferay Portal is flexible in the configuration of system properties and portal properties by setting the property name value pair in `system.properties` and `portal.properties`, respectively. These two files are packaged in `${PORTAL_ROOT_HOME}/WEB-INF/lib/portal-impl.jar`.

By default, some of the portal properties have been preconfigured for faster performance in production. However, these default settings are not suitable for engineers during development mode.

Fortunately, Liferay Portal provides a good mechanism for portal administrators and developers to change the default settings and enable the portal server faster and more convenient development of Liferay plugins such as theme and portlet.

One simple way to create a more development friendly portal server is to copy the following codes from `portal-developer.properties` to `portal-ext.properties` in `${PORTAL_ROOT_HOME}/WEB-INF/classes` directory. Create the `portal-ext.properties` file if it doesn't exist:

```
theme.css.fast.load=false
theme.images.fast.load=false

javascript.fast.load=false
javascript.log.enabled=true

layout.template.cache.enabled=false

browser.launcher.url=

velocity.engine.resource.manager.cache.enabled=false

com.liferay.portal.servlet.filters.cache.CacheFilter=false

com.liferay.portal.servlet.filters.themepreview.
ThemePreviewFilter=true
```

With this approach to enable developer mode, however, the developer would need to modify the `portal-ext.properties` file any time when switches between development and staging/testing environment. A better approach is to change the JVM parameter on the developer's server as shown follows:

```
"-Dexternal-properties=portal-developer.properties"
```

For more details on the Liferay Developer Mode wiki page, please see:

`http://www.liferay.com/web/guest/community/wiki/-/wiki/Main/Liferay+Developer+Mode`.

Once the Liferay Developer Mode has been enabled, you can now use the Firefox plugin Firebug as a debugging tool in your theme development.

Please refer to the documentation at `portal.properties` in `${PORTAL_ROOT_HOME}/WEB-INF/lib/portal-impl.jar` file for a better understanding of what these properties mean.

Modifying the generated files

The first file you might want to modify is the `${liferay.plugins.sdk.home}/themes/{your.theme.home}/docroot/WEB-INF/liferay-plugin-package.properties`.

You might want to change the default values for `page-url` to your organization's web URL or personal URL, the author to your own name, and the license type. Also, the value of module-incremental-version property is added to the theme WAR file name. For example:

```
name=Palm-Tree Publications Theme
module-group-id=liferay
module-incremental-version=1
tags=
short-description=
change-log=
page-url=http://www.palmtreepublications.com
author=Frank Yu
licenses=
```

When the theme is built and packaged, you will see a theme WAR file name has the pattern of <plugin name-theme>-<version number>.< module-incremental-version> with a WAR extension, for example `palmtree-theme-6.0.5.1.war`.

If you wish to change the default values of these entries for each theme generated from the `create` command, you can unzip `${liferay.plugins.sdk.home}/themes/theme.zip` to a local folder named `theme`, change the default values in `/theme/docroot/WEB-INF/liferay-plugin-package.properties`, and re-zip the theme folder to `theme.zip`, and overwrite the `${liferay.plugins.sdk.home}/themes/theme.zip`. From now on, all themes generated from the create theme command in this Plugins SDK will have your own default values.

Adding your own theme files to subfolders of _diffs folder

As explained earlier, you can run `ant deploy` to build, package, and deploy the theme generated from the `create` theme command. However, the packaged theme has the default files from Liferay Portal and is not what you would like to use for your own application.

In order to achieve your own styling of your theme design, you need to create your own CSS, images, JavaScript, and even Velocity templates. In most cases, fortunately, you don't have to create hundreds of such files from scratch. You can leverage most of the existing files copied from Liferay Portal, and create or modify only those files you need for your own design.

Theoretically, you can directly modify or overwrite any of the files in the `css`, `images`, `js`, and `templates` subfolders under the theme's `docroot` directory that are automatically copied from Liferay Portal. You can then run `ant deploy` to build the WAR file, deploy the theme in Liferay Portal, and see your changes when the theme is applied to a site or an individual page.

However, this is a common mistake for many theme developers for multiple reasons:

- With hundreds of files in the theme's `docroot` folder, it would be difficult for the theme developers to track what was changed for your own theme
- More importantly, the direct changes in the `css`, `images`, `js`, and `templates` subfolders will be lost because these subfolders will be completely deleted when the `ant clean` task is run
- The code base of your theme would not be maintainable

Fortunately, Liferay Portal provides a much better and maintainable mechanism for the theme developers to create their own files or modify any existing files, while in the meantime, to be able to leverage most of the existing files copied from Liferay Portal.

Inside the newly created theme, you have `/docroot/_diffs` folder. This `_diffs` directory is the starting point where all of your new or modified CSS, images, JavaScript, Velocity templates files should be saved. Keep in mind that you put only the differences of the customized theme in this `_diffs` folder and do not copy the original unchanged Liferay files in this folder. By following this best practice, you will have a much more maintainable code base and a much easier task when migrating the theme to a newer version in the future.

Creating your own CSS definitions in /docroot/_diffs/css/custom.css

At the very least, you need to modify the `custom.css` file to change the way your theme looks. It is highly recommend that all the changes be made to this `custom.css`, as all the other CSS files are used to provide basic structure to your theme. You do not need to copy the unchanged CSS definitions from Liferay Portal into this file because they will be copied automatically when the theme is built and packaged. You can create a subfolder `css` in `_diffs` folder and save `custom.css` in the `/docroot/_diffs/css` folder.

Creating your own JavaScript in /docroot/_diffs/js/main.js

Likewise, you can create `main.js` file and add all of your custom JavaScript codes in this file and save it under `/docroot/_diffs/js` folder. Again, as part of the best practice of theme development, you do not need to copy any original unchanged JavaScript codes from Liferay Portal into this `main.js`.

Creating your own images in /docroot/_diffs/images folder or subfolders

If you need to overwrite any of the out-of-box images that are copied from Liferay Portal to your theme's `/docroot/images` folder, you need to create or modify the targeted image, save it as the same file name, and then put it to corresponding subfolder under `/docroot/_diffs/images` folder. Your own image will overwrite the default image with the same filename. You need to make sure you fully test the modified image including its color, size, and so on in the portal or portlet.

If you need to add some new images for your own theme, you can save them in the `/docroot/_diffs/images/custom` folder or its subfolder, as you wish. This way you can separate your own images from the original out-of-the-box images.

You might also want to create two images `screenshot.png` and `thumbnail.png` to show how a page with current theme looks like. You can also create a subfolder `searchbar` and put all the search-related images in this `/docroot/_diffs/images/searchbar` subfolder.

As you can see here, all the customized images are supposed to be put in the theme's `/docroot/_diffs/images` folder or its sub-folders.

All the theme images can be accessible in your theme through relative path or absolute path. For example, you can use the following relative path in your `custom.css`:

```
background: url(../images/navigation/bullet_selected.png) no-repeat
5px 50%;
```

You can also use the following absolute path in your Velocity template such as `portal_normal.vm`:

```
<img src="/{theme-folder-name}/images/custom/home.gif" class="icon">
```

Where `{theme-folder-name}` should be replaced with your theme folder name such as `palm-tree-publications-theme`.

Adding your own velocity templates in /docroot/_diffs/templates folder

You might want to create a `templates` subfolder under the theme's `/docroot/_diffs/` folder and add customized velocity template files such as `init_custom.vm`, `navigation.vm`, `portal_normal.vm`, `portal_pop_up.vm`, and `portlet.vm`. A good strategy is to refer to those files with same names in `/docroot/templates` folder as a starting point.

Please note that you can use JSP files in template files under this `/docroot/_diffs/templates`. You can use JSP in the template files to gain more flexibility or if you don't know velocity well. However, you won't have access to the velocity variables if JSP files are in use.

Now let's look at the individual template and how you might be able to customize it.

init_cutom.vm

In this file, you can declare all variables used in `portal_normal.vm`. For example:

```
#set ($theme_name = "palm-tree-publications-theme")
#set ($the_title = "Palm Tree Publications Theme")
#set ($company_name = "Palm Tree Publications Inc.")
#set ($community_name = "Palm Tree Publication Reviewers")
#set ($any_custom_name = "This is just a sample custom name")
```

Please note that you can add any new velocity variable declaration such as `$any_custom_name` above in this `init_custom.vm` file for use in the theme.

You can also overwrite the value of any existing velocity variable such as `$company_name` above if you have the same variable name here.

portal_normal.vm

As explained earlier, this is the core file to serve as the main frame for template. Any new or existing variable defined in the `init_custom.vm` file can be called in this `portal_normal.vm`.

You can also add new or update existing HTML codes, or call the CSS definitions in this file to achieve your own design. For example, you might want to change the display contents and/or look and feel in the header or footer area.

If you need to customize the footer, you can do so by changing the codes between `<footer>` and `</footer>` HTML5 elements in `portal_normal.vm` file. If you need to add a new velocity template, such as `/docroot/_diffs/templates/any_custom_velocity_file.vm`, the following line of code is to include this file in `portal_normal.vm`:

```
#parse ("$full_templates_path/any_custom_velocity_file.vm")
```

navigation.vm

As explained earlier, this navigation template is called, as shown, in `portal_normal.vm` to display the navigation menu:

```
#if ($has_navigation)
  #parse ("$full_templates_path/navigation.vm")
#end
```

You can customize the `navigation.vm` file if you would like to change the display of the navigation menu.

portlet.vm

This Velocity template specifies how a standard portlet would be rendered on a portal page. It is called, as shown next, in `portal_normal.vm`:

```
$theme.wrapPortlet("portlet.vm", $content_include)
```

The chrome can be customized by adding some other functions such as print and help icons or removing some of the existing icons such as minimize, maximize, or close in the `portlet.vm` file. Please note that the changes to this file will be applied to all the pages using this theme.

Take a closer look at the line of code given earlier; you can see that a list of Velocity tags is available to your theme in the following file:

```
${liferay.portal.src.dir}\util-taglib\src\com\liferay\taglib\util\
VelocityTaglib.java
```

Each method in this file is available in the theme as a Velocity tag through `$theme.{method.name}` such as:

```
$theme.iconOptions()
$theme.iconMinimize()
$theme.iconMaximize()
$theme.iconClose()
$theme.iconPortlet()
$theme.search()
```

portal_pop_up.vm

If you need to customize the look and feel of Liferay pop-up notification windows, you need to do so in the theme's `/docroot/_diffs/templates/portal_pop_up.vm` file.

Building the theme as WAR file and deploying It

Now the theme has been created and updated with your own files. It is time to build and deploy it in Liferay Portal.

Packaging the theme as WAR File

As explained in *Chapter 1*, Liferay Portal packages files in `_unstyled` directory for a basic skeleton theme and files in `_styled` directory for basic styling for the skeleton theme. When you customize your own theme, you save your changes in your theme's `/docroot/_diffs` directory. Now you get the files in the following three directories:

```
${PORTAL_ROOT_HOME}/html/themes/_unstyled
  /css
  /images
${PORTAL_ROOT_HOME}/html/themes/_styled
  /css
  /images
  /js
  /templates
${PORTAL_ROOT_HOME}/themes/{your.theme}/docroot/_diffs
  /css
  /images
  /js
  /templates
```

When a new theme is built and deployed, the `ant compile` task copies all the files from the Liferay's `${PORTAL_ROOT_HOME}/html/themes/_unstyled/` folder to the theme's `docroot` folder first. It then copies all the files from Liferay's `${PORTAL_ROOT_HOME}/html/themes/_styled/` to the same `docroot` folder. Later, it copies all the files from the theme's `/docroot/_diffs` folder to the same `docroot` folder. This means any existing CSS, images, JavaScript, and template files copied directly from Liferay's `_unstyled` or `_styled` folders will be overwritten by your versions of files from the corresponding subfolders in the `/docroot/_diffs` folder.

Now the `css`, `images`, `js`, and `templates` subfolders under the theme's `docroot` folder contain all the merged files from Liferay's `/_unstyled` and `/_styled` folders and then from your own files in the theme's `/docroot/_diffs` folder, in the order specified. This is how Liferay Plugins SDK makes sure that your own customization in `_diff` folder will always have the highest priority to overwrite Liferay's default files, and thus achieve your own design's look and feel.

As explained earlier, the `ant deploy` task packages and saves the theme WAR file in `${liferay.plugins.sdk.home}/dist` folder, and in the meantime, copies the WAR file to `${liferay.bundles.home}/deploy` folder for deployment. If you prefer to build and package the theme but not to deploy it to the `${liferay.bundles.home}/deploy` folder, you can simply run the `ant war` task.

Hot deployment of theme

Liferay Portal plugin, such as portlet and theme, is a specialized web application. It is packaged in WAR format and can be hot deployed in the application server or servlet container on which Liferay Portal is running. The hot deployment means that Liferay Portal will pick up the deployment of a portlet, theme, layout template, hook, or other plugins without restarting the application server or servlet container. This is a big advantage because the portal administrator can deploy new Liferay plugins without system down time.

You can get a theme WAR file from either your own packaged theme or you can download it from somewhere else such as Liferay Plugin repository.

The theme WAR files can then be deployed in two different ways—one is through the GUI-based Liferay Control Panel and the other one is to drop the war file to `${liferay.bundles.home}/deploy` folder in the file system. Depending on your access permission and whatever is more convenient, either way will do the job equally well.

Deploying theme in file system

If you have access to the file system of your Liferay Portal, you might want to deploy the theme WAR file by dropping it in the `${liferay.bundles.home}/deploy` folder, where Liferay Portal listens to for auto deployment. This default folder location is also configurable.

If your Liferay Portal server is up and running already, the hot deployment will be done automatically. If your server is down, you need to bring the server up so the hot deployment can be completed.

Deploying theme in Liferay Control Panel

Sometimes, you might prefer to take advantage of hot deployment through the GUI in Lifery Control Panel. Here are the steps:

1. Log in as portal administrator.
2. Go to **Control Panel**.
3. Click on the **Plugins Installation** in the **Server** section of menu.
4. Click on the **Theme Plugins** link.
5. Click on the **Install More Themes** button.
6. Click on the **Upload File** link.
7. Click on the **Browse** button to browse to the location of your theme WAR file such as `palmtree-theme-6.0.5.1.war` in the `${liferay.plugins.sdk.home}/dist` folder.
8. Select the WAR file to be deployed.
9. Click on the **Open** button.
10. Then click on the **Install** button.
11. The theme is hot deployed and a message **Your request processed successfully** will be displayed, if the deployment goes through well.

Verifying the theme

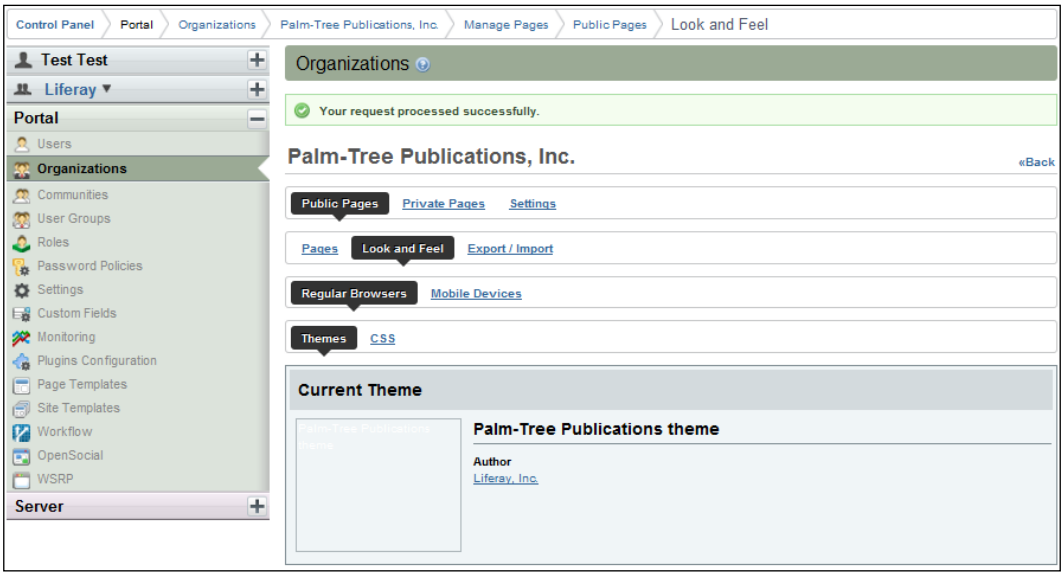
Now you have your own theme deployed in Liferay. It is time to apply this theme to all the public or private pages of a site (organization or community), or any individual page.

To do so, you need to create a site with one or multiple pages. Let's use Palm-Tree Publications as a sample organization site again. You can follow the instructions given as follows:

1. Log in as portal administrator.
2. Go to **Control Panel** | **Organizations** | **Create Palm-Tree Publications** organization.
3. Go to **Manage Pages** of Palm-Tree Publications.
4. Add a **Public Page** named Home.
5. Click on the **Look and Feel** link.
6. Take the default **Regular Browsers** option and the default **Themes** tab.

7. Click on the **Palm-Tree Publications** theme in the **Available Themes** section.
8. Now go to the **Public Page Home** of Palm-Tree Publications organization and verify the look and feel of the home page.

The following screenshot shows how a portal administrator can apply Palm-Tree Publications theme to the public pages of Palm-Tree Publications organization in the Control Panel of Liferay Portal 6.0.



Summary

In this chapter, you have learned the basic concepts of Liferay Portal theme, how to set up Liferay Plugins SDK for theme development, how the theme is created, where files are copied from, and where you are supposed to create your own new files or modify any existing files based on Liferay's source codes. You also learned how to update each individual file in the subfolder, including `css`, `images`, `js`, and `templates` in the theme's `/docroot/_diffs` directory, and how to package, deploy, and test the themes.

In the next chapter, we are going to look at the layout templates that control the portal page's layouts.

3
Layout Templates

As explained in the last chapter, a portal page typically includes a header with a logo, a navigation menu (horizontal and/or vertical navigation tabs), a portlet content area, and a footer. There are two layers of abstraction to generate a portal page in Liferay.

The first layer is with a theme, which generates these components in a tightly coupled way on a page. A theme also includes the necessary CSS and images to present these components on a portal page in a visually appealing way.

The portlet content area includes one or more portlets. These portlets serve as the functional components of a page. They might be applications with different backend systems and don't necessarily follow one another in a sequential order. Therefore, it is necessary for administrators or other users with **Manage Pages** permission to be able to add, remove, or rearrange their portlets in a desired way during staging or even runtime. Liferay has abstracted out the ability into a separate component called the **Layout**. The value of this abstraction becomes evident when a Portal Administrator changes the layout and thereby repositions the portlets on some of the portal pages that all have the same theme applied.

The layout is a fragment that fits inside a page generated by theme but wraps the portlets to control how portlets will be arranged on a portal page. They are usually grid-like structures and are mostly created in HTML tables with rows and columns or CSS-based containers separated by `div` tags. It is also typical to apply CSS definitions to control the characters such as the width and padding of each grid. For each portal page, there will be one corresponding layout template in the main content area, where users with the appropriate permissions can drag-and-drop the portlets into the targeted grids in the desired order.

It is the combination of theme and layout that controls how a portal page is presented to end users. We have learned some basic concepts of theme and how to develop a theme in **Liferay Plugins SDK** in *Chapter 2*. We are going to look at the details of layout templates in this chapter.

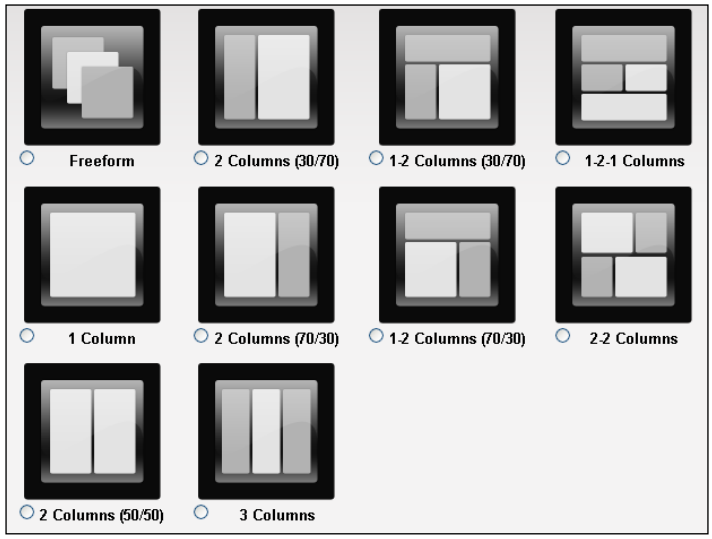
By the end of this chapter, you will have learned:

- Using the out-of-box layout templates in Liferay Portal
- How theme and layout template work together to control the look and feel of a portal page
- The basic structure of a layout template
- Liferay out-of-box standard layout templates
- Liferay out-of-box custom layout templates
- Creating a new custom layout template
- How is a layout template rendered in Liferay
- Default configurations for layout templates

Using the out-of-box layout templates in Liferay Portal

Liferay Portal has some built-in layout templates in its release. These templates are available for administrator or other users with **Manage Pages** permission to apply individually on a portal page. They can meet most of the basic use cases.

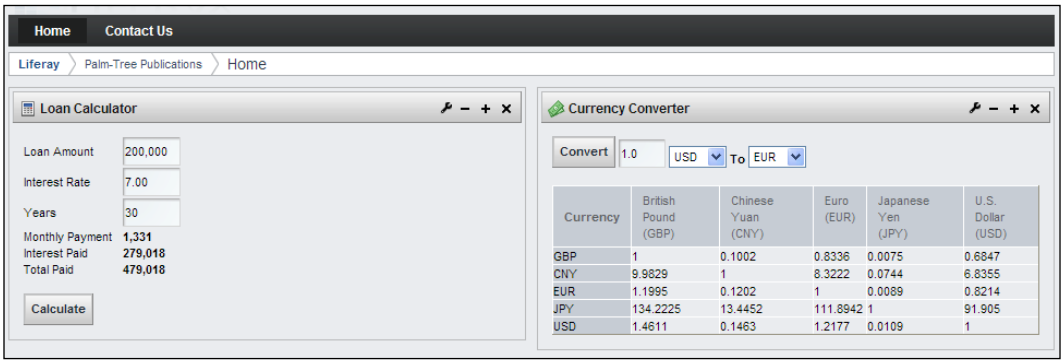
To see what layout templates are available out-of-box, you can log in as a Portal Administrator, go to the **Manage** | **Page Layout** link in the Dockbar area, you will see a popup page as shown in the following screenshot to list all preloaded layout templates that are available in Liferay Portal.



Now let's see how we can dynamically apply a layout template to a portal page. Again, let's use the **Palm-Tree Publications** as a sample organization and follow the directions below:

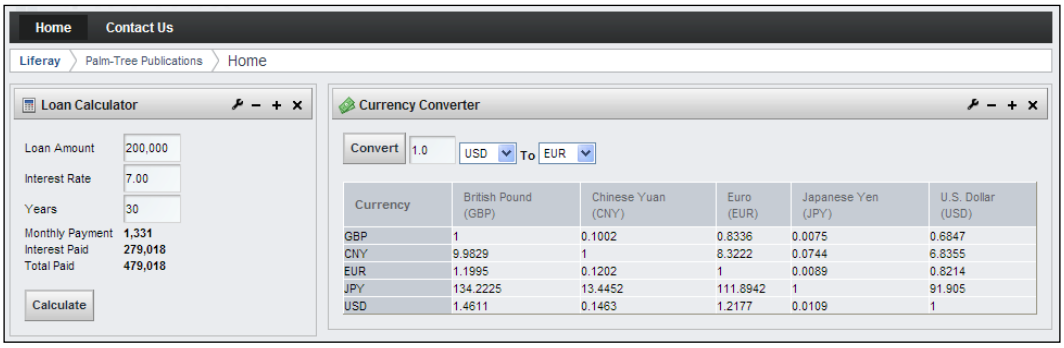
1. Log in as a Portal Administrator.
2. Create **Palm-Tree Publications** organization, if you haven't done so yet.
3. Go to **Manage Pages** of **Palm-Tree Publications** organization.
4. Create one public page named **Home** within this organization.
5. Add this administrator user to this organization.
6. Go to the public **Home** page of this organization.
7. Click on **Manage** | **Page Layout** link in the Dockbar area.
8. Select **2 Columns (50/50)** layout template, and then click on **Save** button to save the change.
9. Now click on **Add** | **More...** link in the Dockbar area.
10. Search or browse to **Loan Calculator** portlet in the **Add Application** pop_up panel.
11. Add this portlet to the first column of the page by either clicking on the **Add** link next to the portlet or dragging-and-dropping it to the first column.

Repeat the last two steps to add the **Currency Converter** portlet to the second column of the page. You can see these two portlets loaded on the page side by side, as shown in the following screenshot:



As you can see, you have created a public page with **2 Columns (50/50)** layout applied. Each of the two portlets takes 50% of the width in the portlet content area. This layout with two equally wide columns in one row is generated from the applied **2 Columns (50/50)** layout template.

You can easily change the page's layout to use a different layout template. Click on **Manage | Page Layout** link in the Dockbar area, then click on **2 Columns (30/70)** layout template, and then click the **Save** button to save the change. Now you can see that your **Home** page is displayed in a different way as shown in the following screenshot, even though all page components including Dockbar, header, navigation menus, portlet contents, and footer are exactly same as when the **2 Columns (50/50)** layout template is applied on the same page.



Controlling the look and feel of a page with themes and layout template

As explained in *Chapter 2*, `portal_normal.vm` file of each theme includes different sections to generate HTML5 elements as well as the theme's components including Dockbar, header with logo, navigation menus, portlet contents, footer, and so on. The CSS, JavaScript, and images in the theme control the general look and feel of a portal page when the theme is applied to all public and/or private pages of the site, or individually on a particular page. This is the first level of abstraction of presentation.

The layout is a fragment that fits inside a page generated by the velocity file `portal_normal.vm` of a Liferay theme. The content area of each portal page consists of a set of portlets wrapped by the layout. This is the second level of abstraction of presentation.

While the theme controls the general visual appearance of a page, a layout is a separate component invoked in a theme to wrap the way portlets are rendered and presented on a portal page. Different theme and layout template can be applied independently to a portal page during runtime. However, it is always the combination of one particular theme and one particular layout that works together for the general look and feel of any particular portal page at any particular runtime.

The portlets on a particular page serve as the third level of abstraction by providing real portal functionalities. We will discuss the look and feel inside the portlet in later chapters in this book.

Let's take a look at the following block of code from `portal_normal.vm`, which is located in `${PORTAL_ROOT_HOME}\html\themes\classic\templates` folder. Let's take the Liferay **Classic** theme as an example to show how the theme, layout template, and portlets work together to create a portal page:

```
<div id="content">
   <nav class="site-breadcrumbs" id="breadcrumbs">
      <h1>
         <span>#language("breadcrumbs")</span>
      </h1>
      #breadcrumbs()
   </nav>

   #if ($selectable)
      $theme.include($content_include)
   #else
      $portletDisplay.recycle()
      $portletDisplay.setTitle($the_title)
      $theme.wrapPortlet("portlet.vm", $content_include)
   #end
</div>
```

This code creates a `div` tagged portlet `content` area for all portlets to be rendered on a page. The first part is `site-breadcrumbs` for users to easily identify where the page is located in the navigation. The `$content_include` velocity attribute above calls either `${PORTAL_ROOT_HOME}/html/portal/layout/view/portlet.jsp` or `${PORTAL_ROOT_HOME}/html/portal/layout/edit/portlet.jsp`, which in turn calls the static `processTemplate` method of `RuntimePortletUtil.java` to generate the applied layout template and calls `liferay-portlet:runtime` tag library recursively to render all portlets loaded on the page. We will cover how a portal page is rendered in more detail later in this chapter.

The basic structure of a layout template

By now, we know what a layout can do in a portal page presentation. To better understand the layout and its structure, we are going to use one of Liferay's out-of-box layout templates as an example before we actually start working on our own custom layout template.

Let's take a look at the following highlighted lines in:

`${PORTAL_ROOT_HOME}/WEB-INF/liferay-layout-templates.xml`

```
<?xml version="1.0"?>
<!DOCTYPE layout-templates PUBLIC "-//Liferay//DTD Layout Templates
6.0.0//EN" "http://www.liferay.com/dtd/liferay-layout-templates_6_0_
0.dtd">

<layout-templates>
  // ignore details
</layout-templates>
```

As you can see, this XML file starts with a XML version and includes a DTD for the Layout Templates' parameters for Liferay Portal as in the highlighted line.

The `DOCTYPE` definition available at `http://www.liferay.com/dtd/liferay-layout-templates_6_0_0.dtd` specifies that there are two types of layout templates: **standard** and **custom**. Both of them have the same set of parameters.

According to the DTD definition, each `layout-template` includes a `template-path` element, a `wap-template-path` element, an optional `thumbnail-path` element, and an optional `roles` element. The optional `roles` element contains a list of role names which designate the names of security roles in Liferay Portal. Users who have any of these roles will be able to apply this layout template to a portal page. Anyone can use this layout template if no role names are set.

Liferay out-of-box standard layout templates

Before we discuss the standard layout templates, let's take a look at the portlet window states.

As defined in `javax.portlet.WindowState.java`, there are three standard portlet window states specified in JSR 168 portlet specification.

- `WindowState.MAXIMIZED`: The `MAXIMIZED` window state is an indication that a portlet may be the only portlet being rendered on the portal page, or that the portlet has more space compared to other portlets on the portal page.
- `WindowState.MINIMIZED`: When a portlet is in `MINIMIZED` window state, the portlet should only render minimal output or no output at all.
- `WindowState.NORMAL`: The `NORMAL` window state indicates that a portlet may be sharing the page with other portlets.

There are also two custom Liferay window states as defined in:

`${PORTAL_ROOT_HOME}/WEB-INF/portlet-custom.xml`

```
<custom-window-state>
   <window-state>exclusive</window-state>
</custom-window-state>
<custom-window-state>
   <window-state>pop_up</window-state>
</custom-window-state>
```

These two custom window states are for different purposes:

- `Exclusive`: The custom exclusive window state is used for streaming binary files and does not have a render phase. This is useful when AJAX is used to call the server and get data updated within a particular area of a portlet without refreshing the whole portal page.
- `pop_up`: There are two kinds of pop_up windows: Floating div pop_up and window pop_up. In case of floating div pop_up, we need to have the `windowState` parameter set to `LiferayWindowstate.EXCLUSIVE` in order to make an asynchronous call to a portlet URL. On the other hand, a window pop_up such as the Print page of a portlet is loaded in a new browser window. A pop_up portlet must have its `windowState` parameter in the portlet URL set to `LiferayWindowState.POP_UP`.

Three of the above standard and custom window states are defined in the following file in Liferay: **exclusive**, **maximized**, and **pop_up**.

`com.liferay.portal.kernel.portlet.LiferayWindowState.java`

Correspondingly, there are three standard layout templates in Liferay: exclusive, max, and pop_up, which are shown in `${PORTAL_ROOT_HOME}/WEB-INF/liferay-layout-templates.xml` file as below:

```
<standard>
   <layout-template id="exclusive">
      <template-path>/layouttpl/standard/exclusive.tpl</template-
path>
      <wap-template-path>/layouttpl/standard/exclusive.wap.tpl</
wap-template-path>
      <thumbnail-path>/layouttpl/standard/exclusive.png</thumbnail-
path>
   </layout-template>
   <layout-template id="max">
      <template-path>/layouttpl/standard/max.tpl</template-path>
```

```
            <wap-template-path>/layouttpl/standard/max.wap.tpl</wap-
   template-path>
            <thumbnail-path>/layouttpl/standard/max.png</thumbnail-path>
         </layout-template>
         <layout-template id="pop_up">
            <template-path>/layouttpl/standard/pop_up.tpl</template-path>
            <wap-template-path>/layouttpl/standard/pop_up.wap.tpl</wap-
   template-path>
            <thumbnail-path>/layouttpl/standard/pop_up.png</thumbnail-
   path>
         </layout-template>
      </standard>
```

The files of these three out-of-box standard layout templates are located in the `${PORTAL_ROOT_HOME}/layouttpl/standard` directory as a series of `.tpl` files and `.png` files. As shown in the following `exclusive.tpl` file, a layout template includes CSS definitions such as `portlet-column` in some `div` tags to control the layout UI. The key code for processing portlet content within each layout column is on the highlighted line.

```
<div class="columns-max" id="main-content" role="main">
   <div class="portlet-layout">
      <div class="portlet-column portlet-column-only" id="column-1">
         $processor.processMax("portlet-column-content portlet-column-
content-only")
      </div>
   </div>
</div>
```

If you compare a file of one standard layout template, such as `exclusive`, with the corresponding file of another standard layout template, such as `pop_up`, you will find that they are exactly the same. The difference is with backend processing.

Liferay out-of-box custom layout templates

Similar to the above three out-of-box standard layout templates, there are ten out-of-the box custom layout templates defined in:

`${PORTAL_ROOT_HOME}/WEB-INF/liferay-layout-templates.xml`

```
<custom>
<layout-template id="freeform" name="Freeform">
   <template-path>/layouttpl/custom/freeform.tpl</template-path>
   <wap-template-path>/layouttpl/custom/freeform.wap.tpl</wap-
template-path>
```

```
      <thumbnail-path>/layouttpl/custom/freeform.png</thumbnail-path>
      <roles>
         <role-name>User</role-name>
      </roles>
   </layout-template>
   <layout-template id="1_column" name="1 Column">
      <template-path>/layouttpl/custom/1_column.tpl</template-path>
      <wap-template-path>/layouttpl/custom/1_column.wap.tpl</wap-
   template-path>
      <thumbnail-path>/layouttpl/custom/1_column.png</thumbnail-path>
   </layout-template>
   // ignore details
   <layout-template id="2_2_columns" name="2-2 Columns">
      <template-path>/layouttpl/custom/2_2_columns.tpl</template-path>
      <wap-template-path>/layouttpl/custom/2_2_columns.wap.tpl</wap-
   template-path>
      <thumbnail-path>/layouttpl/custom/2_2_columns.png</thumbnail-path>
   </layout-template>
   </custom>
```

These ten out-of-box custom layout templates are available for users with right permission (**Manage Pages** permission) to apply individually on a portal page. Their source codes are located in the `${PORTAL_ROOT_HOME}/layouttpl/custom` directory as a series of `.tpl` files and `.png` files. Similar to the file in standard layout templates, the velocity method `$processor.processColumn` in each `.tpl` file plays a key role in generating the portlet contents in a particular column ID as shown in the following code snippet:

```
$processor.processColumn("column-1", "portlet-column-content portlet-
column-content-only")
```

Creating a new custom layout template

We now know what a layout template is about, what it does, and how to apply one of the Liferay's out-of-box custom layout templates on a portal page. It is time for us to create our own custom layout template.

Creation of layout templates is done in a similar manner to the creation of portlets and themes. It can be accomplished using the Liferay Plugins SDK.

Creating the skeleton of a layout template in Plugins SDK

There is a `layouttpl` folder inside the Liferay Plugins SDK where all new layout templates reside. The SDK provides a script file to create the skeleton of a new layout template. To create a new layout template, you run a command in this `layouttpl` folder similar to the one you use to create a new portlet or theme.

Now navigate to `${liferay.plugins.sdk.home}/layouttpl` folder and run `create` script as:

For Windows:

```
create <layout-template-name> "<layout template simple description>"
```

For Unix/Linux/Mac:

```
./create.sh <layout-template-name> "<layout template simple description>"
```

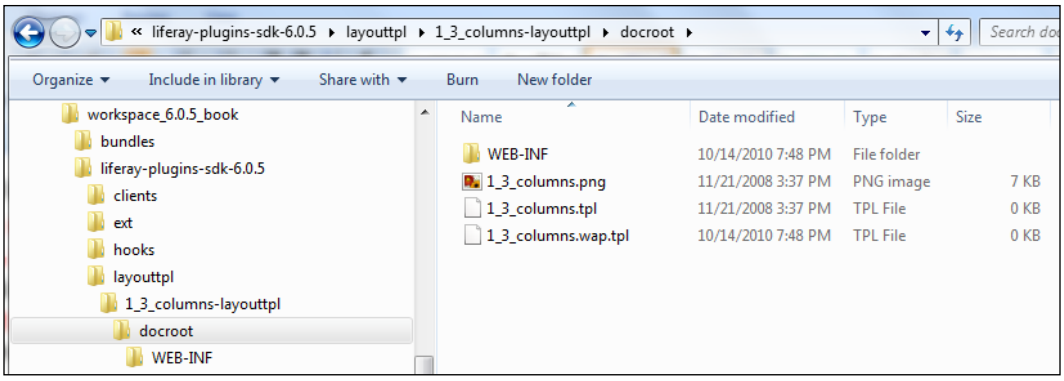
Where `<layout-template-name>` is the layout template folder name within the file structure, and `<layout template simple description>` is the text that will actually be displayed on the **Manage | Page Layout** page. The layout template folder name should not contain empty space in the name. The second parameter must have quotes around it to allow spaces in the description of the layout template to be created.

For example, the following command is to create an empty skeleton of `1_3 Columns` layout template on Windows:

```
C:\workspace_6.0.5_book\liferay-plugins-sdk-6.0.5\layouttpl>create
1_3_columns "1_3 Columns"
```

Liferay offers Liferay IDE as an eclipse plugin. You can use Liferay IDE to create the layout template including the skeleton folders and files generated by the script executed in the above command.

Now you can go to your Windows Explorer and notice that a layout template folder named `1_3_columns-layouttpl` has been created automatically under `${liferay.plugins.sdk.home}/layouttpl` folder. The folder name is same as the layout template name, which was specified as the first input element in the `create` script command, with `-layouttpl` appended to the end of the layout template name. It has the following skeleton:



You will notice the following three files in the `docroot` folder of your layout template:

- `1_3_columns.tpl`: This is the layout template file for regular web browsers.
- `1_3_columns.wap.tpl`: This is the layout template file for mobile devices.
- `1_3_columns.png`: This is the default thumbnail image of what the layout looks like. This thumbnail is displayed when a portal user with right permission clicks **Manage | Page Layout** page from the Dockbar menu.

Liferay can automatically detect the client being used to connect to the portal site and serve up the appropriate template. If the client is a mobile device, it will serve the `1_3_columns.wap.tpl` file. Otherwise, it will serve `1_3_columns.tpl` file for normal web browser.

Adding your own implementation to the layout template files

Both the above generated `1_3_columns.tpl` and `1_3_columns.wap.tpl` files are empty. `1_3_columns.png` is default image that doesn't represent the actual layout template we need to create. The next steps are to add our own codes to the two template files.

Open `1_3_columns.tpl` file with your preferred editor, add the following codes, and then save it.

```
<div class="columns-1-3" id="main-content" role="main">
   <table class="portlet-layout">
   <tr>
      <td class="portlet-column portlet-column-only" id="column-1"
colspan="3">
```

```
            $processor.processColumn("column-1", "portlet-column-content
portlet-column-content-only")
         </td>
      </tr>
      <tr>
         <td class="aui-w33 portlet-column portlet-column-first"
id="column-2">
            $processor.processColumn("column-2", "portlet-column-content
portlet-column-content-first")
         </td>
         <td class="aui-w33 portlet-column" id="column-3">
            $processor.processColumn("column-3", "portlet-column-
content")
         </td>
         <td class="aui-w33 portlet-column portlet-column-last"
id="column-4">
            $processor.processColumn("column-4", "portlet-column-content
portlet-column-content-last")
         </td>
      </tr>
      </table>
</div>
```

Please notice that this layout template has two rows: the first row has only one column and the second row has three equally wide columns. Each cell defined by the row and column has a unique ID such as `column-1`, `column-2`, `column-3`, and `column-4`. This unique ID is important to render the right portlet(s) in the right place on the portal page where this layout template has been applied to.

Now we copy the same code from `1_3_columns.tpl` to `1_3_columns.wap.tpl` file. You can modify `1_3_columns.wap.tpl` file as you wish to refresh your design of layout template for mobile devices.

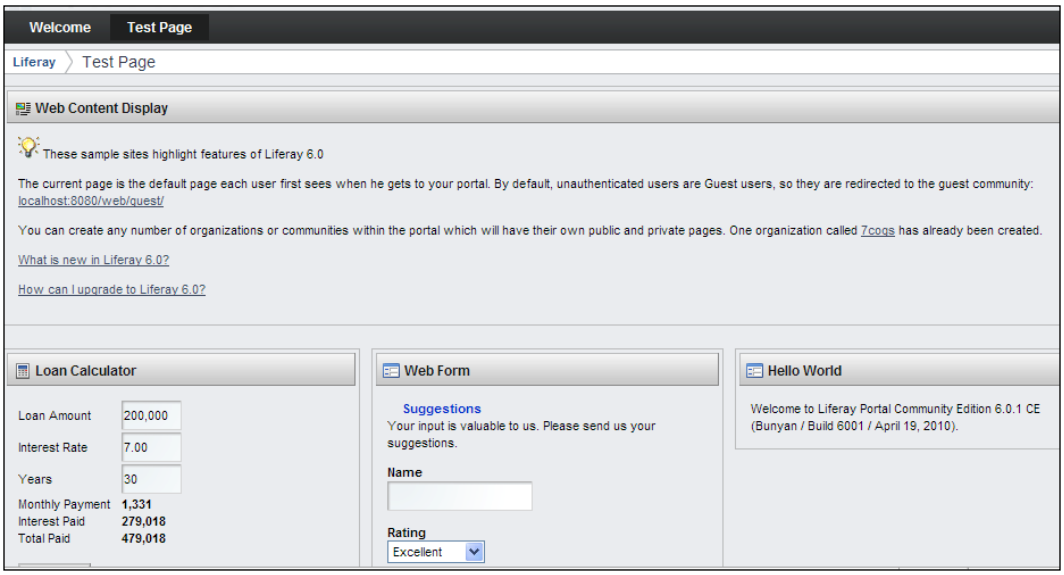
The third thing we need to do is to use an image manipulation program such as GIMP or Adobe Photoshop to create a `1_3_columns.png` that looks like what the layout template is supposed to look like.

Building and registering the layout template

Now we have all necessary files in place. Open the command prompt, change directory to `${liferay.plugins.sdk.home}/layouttpl/1_3_columns-layouttpl` folder, and then run `ant` command to build the custom layout template into a WAR file, which will be copied to the `${liferay.plugins.sdk.home}/dist` folder. The `ant` command will also copy the generated `1_3_columns-layouttpl-<version number>.war` to `${liferay.bundles.home}/deploy` folder for hot deployment in Liferay.

Now log in as a Portal Administrator, and verify the newly created layout template that has been registered in Liferay Portal as shown on **Manage | Page Layout** page:

The next step is to create a test page named **Test Page**, apply the newly created layout template on this page, and add some sample portlets in each cell of the row and column. You can see that this new layout template has been successfully created, deployed, applied to the test page as shown in the following screenshot:


Welcome
Test Page
Liferay
Test Page
Web Content Display
These sample sites highlight features of Liferay 6.0
The current page is the default page each user first sees when he gets to your portal. By default, unauthenticated users are Guest users, so they are redirected to the guest community:
localhost:8080/web/guest/
You can create any number of organizations or communities within the portal which will have their own public and private pages. One organization called 7cogs has already been created.
What is new in Liferay 6.0?
How can I upgrade to Liferay 6.0?
Loan Calculator
Loan Amount
200,000
Interest Rate
7.00
Years
30
Monthly Payment
1,331
Interest Paid
279,018
Total Paid
479,018
Web Form
Suggestions
Your input is valuable to us. Please send us your suggestions.
Name
Rating
Excellent
Hello World
Welcome to Liferay Portal Community Edition 6.0.1 CE (Bunyan / Build 6001 / April 19, 2010).

How is a layout template rendered in Liferay?

We know that a portal page includes theme, a layout template, one or multiple portlets arranged in a grid-like column structure of the layout template. These three layers of abstraction control the look and feel of a portal page and how the portlet contents are arranged in the column layout. Now let's take a look at the code flow and explain how these components work together during a portal page rendering process.

The Main Servlet in Liferay Portal

Liferay Portal is implemented in Struts and includes a Main Servlet with `servlet-class` of `com.liferay.portal.servlet.MainServlet` as registered below in `${PORTAL_ROOT_HOME}/WEB-INF/web.xml` file.

```
    <servlet>
       <servlet-name>Main Servlet</servlet-name>
       <servlet-class>com.liferay.portal.servlet.MainServlet</servlet-
class>
       <init-param>
          <param-name>config</param-name>
          <param-value>/WEB-INF/struts-config.xml,/WEB-INF/struts-
config-ext.xml</param-value>
       </init-param>
       <init-param>
          <param-name>debug</param-name>
          <param-value>0</param-value>
       </init-param>
       <init-param>
          <param-name>detail</param-name>
          <param-value>0</param-value>
       </init-param>
       <load-on-startup>1</load-on-startup>
    </servlet>
```

As shown in the highlighted line above, the Main Servlet includes `load-on-startup` element. The optional content of this element must be an integer indicating the order in which the servlet should be loaded. The container must guarantee that servlets marked with lower integers are loaded before servlets marked with higher integers. There are more than 20 servlets registered in Liferay Portal `web.xml` file and the Main Servlet's `load-on-startup` value of positive integer 1 is lower than any other servlet in this file. This indicates that this servlet should be loaded (instantiated and have its `init()` method called) on the startup of the web application after the portal application is deployed.

Let's take a closer look at the source code of `com.liferay.portal.servlet.MainServlet.java`, which is available in the `liferay-portal-src-{version.number}.zip` from Liferay download page. This servlet's `init()` method calls many other initialization methods to initialize different services, events, actions, and so on. The following three methods are related to portlet contents, layout, and the look and feel (theme) of a portal page:

- `initPortlets` method parses all portlets defined in `portlet-custom.xml`, `portlet-ext.xml`, `liferay-portlet.xml`, and `liferay-portlet-ext.xml` before it calls several other APIs to create the portlets. Depending on your Liferay environment, some of these XML files might not exist.
- `initLayoutTemplates` method parses all layout templates defined in `liferay-layout-templates.xml` and `liferay-layout-templates-ext.xml` before it calls the `init` method of `com.liferay.portal.service.LayoutTemplateLocalServiceUtil` to start layout templates.
- `initThemes` method parses all themes defined in `liferay-look-and-feel.xml` and `liferay-look-and-feel-ext.xml` before it calls the `init()` method of `com.liferay.portal.service.ThemeLocalServiceUtil` to initialize the themes.

In addition to `MainServlet`, you might have noticed the existence of `com.liferay.portal.struts.PortletActionServlet` in the source codes. Both servlets extend from `ActionServlet`. However, `MainServlet` is for Liferay Portal itself which uses Struts while `PortletActionServlet` is for the individual portlet WARs that uses Struts. They have different `struts-config.xml` files so they need different servlets.

Page rendering as explained with code flow

Liferay portal pages are rendered via the following mechanism as a series of steps from a browser request through all the way down to rendering an individual portlet.

1. The initial request comes into the Liferay portal server from the browser, and hits the `service(request, response)` method of servlet `com.liferay.portal.servlet.MainServlet`. This method is to process service request. Various session attributes such as `WebKeys.USER_ID` and `Globals.LOCALE_KEY` are stored in the session. Some request attributes including `PageContext.EXCEPTION` and `WebKeys.CTX` are saved in the request as well. These objects are for use by code downstream.
2. The `MainServlet.processServicePre` method is called.

3. The `com.liferay.portal.events.EventsProcessorUtil.process` method is called to start the preservice events before Struts processes the request. By default, preservice events are implemented in `com.liferay.portal.events.ServicePreAction` because of the following line in `portal.properties`, which is packaged in `portal-impl.jar`.

   ```
   servlet.service.events.pre=com.liferay.portal.events.
   ServicePreAction
   ```

   The layout and theme to be displayed are determined in the `ServicePreAction.servicePre` method. The following list includes some of the request attributes that are stored for downstream code use:

   - `WebKeys.LAYOUT`: The current layout
   - `WebKeys.LAYOUTS`: The other available layouts
   - `WebKeys.THEME`: The theme to display
   - `WebKeys.COLOR_SCHEME`: The color scheme to use for a particular theme. The theme and color scheme are usually determined by querying the layout once it has been determined
   - `WebKeys.THEME_DISPLAY`: All setting related to themeDisplay object

   You can customize the pre-service events by providing your own implementation such as `com.your.own.impl.ServicePreAction.java` in Liferay ext plugin and adding the following configuration line to your `portal-ext.properties`:

   ```
   servlet.service.events.pre=com.your.own.impl.ServicePreAction
   ```

4. The theme infrastructure code will call `com.liferay.taglib.util.ThemeUtil` class to render the content of a theme. It calls either `includeJSP()` method to include JSP rendered content, or `includeVM()` method to include Velocity rendered content.
5. When using a Velocity-based theme, the request will flow through `com.liferay.portal.velocity.VelocityVariables` class and its `insertVariables` method. This is where various Velocity variables are added to the Velocity context for use by the theme system downstream.
6. `/html/common/themes/portal.jsp` is the "top level" display page. It selects the `portal_normal.jsp` or `portal_pop_up.jsp` based on the current state of the theme's display, and includes it using the `<liferay-theme:include>` custom tag, implemented by `com.liferay.taglib.theme.IncludeTag`, which in turn calls `com.liferay.taglib.util.ThemeUtil.include()`.

7. The `MainServlet.callParentService(request,response)` method is called before it calls `super.service(request,response)` method. This `service` method is defined in the superclass `javax.servlet.http.HttpServlet` of `org.apache.struts.action.ActionServlet`.
8. Struts is called to handle the service request. Liferay uses the custom Struts request processor `com.liferay.portal.struts.PortalRequestProcessor`. Its constructor adds `/portal/layout` to its `_lastPaths` attribute and the `PortalRequestProcessor.getLastPath(request)` method computes the last path visited, and supplies a default path for the first entry into the portal.
9. As specified below in `${PORTAL_ROOT_HOME}/WEB-INF/struts-config.xml`, the initial request for `/portal/layout` is handled by `com.liferay.portal.action.LayoutAction`.

```
<action path="/portal/layout" type="com.liferay.portal.action.
LayoutAction">
   <forward name="portal.layout" path="portal.layout" />
</action>
```

10. The following configuration in `${PORTAL_ROOT_HOME}/WEB-INF/tiles-defs.xml` brings the portal page to `/portal/layout.jsp`, which points to `/html/portal/layout.jsp` file.

```
<definition name="portal.layout" extends="portal">
   <put name="content" value="/portal/layout.jsp" />
   <put name="selectable" value="true" />
</definition>
```

11. In the `LayoutAction.execute` method, the following code is used to get the `themeDisplay` and `layout`:

```
ThemeDisplay themeDisplay = (ThemeDisplay)request.getAttribute
(WebKeys.THEME_DISPLAY);

Layout layout = themeDisplay.getLayout();
```

12. `LayoutAction.processLayout` calls the `includeLayoutContent` method as shown below:

```
includeLayoutContent(request, response, themeDisplay, layout);
```

13. `LayoutAction.includeLayoutContent` method renders `/html/portal/layout/view/portlet.jsp` as part of the portal page as shown below:

```
String path = StrutsUtil.TEXT_HTML_DIR;
/* path = "/html" */
```

```
path += PortalUtil.getLayoutViewPage(layout);
/* path = "/html/portal/layout/view/portlet.jsp" */

RequestDispatcher rd = ctx.getRequestDispatcher(path);
rd.include(req, stringServletRes);
```

14. `LayoutAction.processLayout` method renders `/html/portal/layout.jsp` as part of the portal page. This is achieved as below:

```
return mapping.findForward("portal.layout");
```

As you can see in steps 13 and 14, the above `portlet.jsp` and `layout.jsp` are the two key files in portal page rendering. The portal rendering includes layout content before the page loads because portlets on the page can set the page title and page subtitle.

Now let's take a closer look at `/html/portal/layout/view/portlet.jsp` file. The following line takes `velocityTemplateContent` as an input attribute.

```
RuntimePortletUtil.processTemplate(application, request, response,
pageContext, velocityTemplateId, velocityTemplateContent)
```

If you output this `velocityTemplateContent` in a console and you should be able to see the output as shown in the following when you use the custom `1_3_columns` layout template that we created earlier in this chapter.

```
<div class="columns-3" id="main-content" role="main">
        <table class="portlet-layout">
        <tr>
                <td class="portlet-column portlet-column-only"
id="column-1" colspan="3">
                        $processor.processColumn("column-1", "portlet-
column-content portlet-column-content-only")
                </td>
        </tr>
        <tr>
                <td class="aui-w33 portlet-column portlet-column-
first" id="column-2">
                        $processor.processColumn("column-2", "portlet-
column-content portlet-column-content-first")
                </td>
                <td class="aui-w33 portlet-column" id="column-3">
                        $processor.processColumn("column-3", "portlet-
column-content")
                </td>
                <td class="aui-w33 portlet-column portlet-column-last"
id="column-4">
```

```
                        $processor.processColumn("column-4", "portlet-
column-content portlet-column-content-last")
                </td>
        </tr>
        </table>
</div>
```

Does this look familiar? This output is exactly same as in `1_3_columns.tpl` that we created in the custom `1_3_columns` layout template. You see, we have created a custom layout, applied it to a portal page, and this layout template file is assigned exactly as it is to `velocityTemplateContent` attribute.

Now let's come back to `RuntimePortletUtil.processTemplate` API call in `/html/portal/layout/view/portlet.jsp` file and see how it works. First, it generates the following content:

```
<div class="columns-3" id="main-content" role="main">
        <table class="portlet-layout">
        <tr>
                <td class="portlet-column portlet-column-only"
id="column-1" colspan="3">
                        [$TEMPLATE_COLUMN_column-1$]
                </td>
        </tr>
        <tr>
                <td class="aui-w33 portlet-column portlet-column-
first" id="column-2">
                        [$TEMPLATE_COLUMN_column-2$]
                </td>
                <td class="aui-w33 portlet-column" id="column-3">
                        [$TEMPLATE_COLUMN_column-3$]
                </td>
                <td class="aui-w33 portlet-column portlet-column-last"
id="column-4">
                        [$TEMPLATE_COLUMN_column-4$]
                </td>
        </tr>
        </table>
</div>
```

It then generates the following code if we have four portlets A, B, C, and D on this page and they are loaded in columns 1, 2, 3, and 4, respectively.

```
<div class="columns-3" id="main-content" role="main">
        <table class="portlet-layout">
        <tr>
                <td class="portlet-column portlet-column-only"
id="column-1" colspan="3">
                        [$TEMPLATE_PORTLET_A$]
                </td>
        </tr>
        <tr>
                <td class="aui-w33 portlet-column portlet-column-
first" id="column-2">
                        [$TEMPLATE_PORTLET_B$]
                </td>
                <td class="aui-w33 portlet-column" id="column-3">
                        [$TEMPLATE_PORTLET_C$]
                </td>
                <td class="aui-w33 portlet-column portlet-column-last"
id="column-4">
                        [$TEMPLATE_PORTLET_D$]
                </td>
        </tr>
        </table>
</div>
```

This is accomplished by the following code in `RuntimePortletUtil.processTemplate` method.

```
Map<String, String> columnsMap = processor.getColumnsMap();

Iterator<Map.Entry<String, String>> columnsMapItr =
   columnsMap.entrySet().iterator();

while (columnsMapItr.hasNext()) {
   Map.Entry<String, String> entry = columnsMapItr.next();

   String key = entry.getKey();
   String value = entry.getValue();

   output = StringUtil.replace(output, key, value);
}
```

For each column in the page's layout, the `PortletColumnLogic` class processes each portlet using the `processContent()` method. In this method, the HTML that surrounds every portlet is generated. Further processing is then delegated to the `RuntimePortletUtil.processPortlet()` method.

Eventually, for each portlet, the method `com.liferay.portal.util.PortalUtil.renderPortlet()` gets called, which calls `/html/portal/render_portlet.jsp` to render the contents of an individual portlet. That in turn calls `/html/common/themes/portlet.jsp`, which ends up calling `/html/common/themes/portlet_content.jsp`.

Finally, the following line at the end of `RuntimePortletUtil.processTemplate()` API call generates the final output that `portlet.jsp` needs to render.

```
return StringUtil.replace(output, "[$TEMPLATE_PORTLET_", "$]?",
contentsMap);
```

Now the theme, portlets, and layout template on the page are all processed and rendered. The `processServicePost(request,response)` method of the Main Servlet is called in the `finally` block inside the servlet's `service(request,response)` method.

The process method of `com.liferay.portal.events.EventsProcessorUtil` class is called to start the post-service events process after Struts processes the request. By default, post-service events are implemented in `com.liferay.portal.events.ServicePostAction` because of the following configuration line in `portal.properties`:

```
servlet.service.events.post=com.liferay.portal.events.
ServicePostAction
```

Similar to pre-service events, you can customize the post-service events by providing your own implementation such as `com.your.own.impl.ServicePostAction.java` in the ext plugin in Liferay 6.x Plugins SDK and adding the following line to your `portal-ext.properties`:

```
servlet.service.events.post=com.your.own.impl.ServicePostAction
```

This process above outlines some of the main steps to render a portal page with theme, layout template, and one or multiple portlets. It is a pretty complex chain of actions. For simplicity, some other API calls in this process are not listed here.

Default configurations for layout template

Liferay Portal set hundreds of default configurations in `portal.properties` file, which is packaged in `${PORTAL_ROOT_HOME}/WEB-INF/lib/portal-impl.jar` file. Some of these configuration settings are related to layout settings and can be overwritten in `portal-ext.properties` file.

Setting the default layout template ID

By default, Liferay uses `2_columns_ii` layout template as the default layout. If you wish, you can change this default setting to your own layout template such as `1_3_columns` layout template that we created early in this chapter. This can be done by adding the following line to the `portal-ext.properties` file of your Liferay installation. Please note that you can find the layout template ID in `liferay-layout-templates.xml` file of your layout template.

```
default.layout.template.id=1_3_columns
```

Other default settings such as the default Guest Public Layouts, default User Public Layouts, default User Private Layouts, and so on can also be configured in `portal-ext.properties` file. You can find more details about the original default settings in `portal.properties`.

Summary

In this chapter, you have learnt the basic concepts of Liferay Portal layout template, and how the theme, layout, and portlets work together to generate a portal page, how to create your own layout template, and page rendering code flow, and so on.

In the next chapter, we are going to look at the styling of portal pages.

4
Styling Pages

A typical portal application consists of multiple pages, which include public and/or private pages for users with different access privileges. Each page includes one theme to control its general look and feel, one or multiple portlets to render its contents or services, and a layout template to arrange the location and space of each portlet within the page scope.

In *Chapter 2*, we covered the basic concepts of theming and how to develop a custom theme in Liferay Plugins SDK. In *Chapter 3*, we then discussed the concepts of layout template, the workflow of page generation in Liferay, and how to develop a custom layout template.

Now it is time for us to look at how we can create a portal site by leveraging Liferay Portal's powerful mashup functionalities. We'll focus on how portal pages are created and styled and also discuss some simple configuration and customizations to change the look and feel of a portal page.

By the end of this chapter, you will have learned:

- About some Liferay terminologies such as resources, users, groups, roles, team, permission, organization, community, public/private pages, and page/site templates
- How to set up an organization or community
- About the UI and usability features in Liferay Portal 6 such as concise and convenient navigation, easy page and site creation based on templates
- About Internalization (i18n) and localization (L10n) at different levels including database, portal framework, custom portlets, and other related configurations
- About UI customizations such as the change of default theme, layout, and logo, and customizations of Dockbar, header, Add Application panel, and Control Panel
- About portlet UI customizations including UI changes through configuration, Search Container, OpenOffice integration, WYSIWYG online editor, Portlet Preferences API

A review of some Liferay terminologies

A traditional membership security model includes two aspects: authentication and authorization.

- **Authentication** is the process of verifying a claim made by a subject that it should be allowed to act on behalf of a given principal (person, computer, process, and so on). This process is usually based on a username and password but other mechanisms such as two-factor authentication are also common in enterprise applications.
- **Authorization**, on the other hand, involves verifying that an authenticated subject has permission to perform certain operations or access specific resources. Authentication, therefore, must precede authorization.

Liferay Portal extends the traditional membership security model with a role-based, fine-grained, full access control security model. To better understand how this security model works and how to set up a portal application, we need to know some terminologies such as resources, users, user groups, roles, role-based access control (permissions), organizations, locations, communities, my community, and so on. We are going to take a brief review of these terminologies below. Please refer to Dr. Jonas Yuan's book *Liferay Portal 6 Enterprise Intranets* (PACKT Publishing, May 2010) for more details about these concepts and their relationship with each other.

Resources

A **Resource** is a base object. It can be a portlet, an entity such as a post in **Message Board** portlet, a file, a folder, a user, a role, a group, a page, a content type, and so on.

Users

Users are individuals who perform tasks within the portal. The user's ability to perform such tasks is controlled by his/her permission through roles. Each user by default can have his/her own public pages and/or private pages in his/her own **My Community**, which can be turned off through configuration.

User groups

User groups are loose groups of users, regardless of community or organization membership. Administrators can define a user group and add users to the user group. Administrators can also assign the user group as members of an organization or community if this feature is enabled in `portal-ext.properties`. Each user group can have its configurable public pages and/or private pages, and when a new user is

first associated with this user group, the preconfigured public and/or private pages of the user group will be copied to the public and/or private pages of the user's My Community.

Roles

Roles are collections of permissions. Roles can be assigned to a user, user group, community, location, or organization. If a role is assigned to a user group, community, organization, or location, then all users who are members of that entity receive permissions of the role.

Team

A **Team** is a new concept introduced in Liferay Portal 6.0. Users including super administrators and organization/community administrators can go to each organization or community and then click on the **Actions** button to choose **Manage Teams** option. What this does is create one or multiple teams inside the selected organization/community. The team is visible within the selected organization or community only. Users within the selected organization/community scope can be added to a team. The notion of a team is very similar to that of a role and you can add permission to a team. However, there is a major difference: a role itself has portal wide scope while a team is limited to a particular organization or community.

Role-based access control (permission)

Permission is an action on a resource. Portal-level permissions can be assigned to the portal through roles. Group-level permissions can be assigned to groups such as organization and communities. Page-level permissions can be assigned to page layouts. Model permissions can be assigned to model resources such as blogs entries. Portlet-level permission can be assigned to different modes of portlets such as View, Edit, or Configuration.

Organization

An **organization** represents the enterprise-department-location hierarchy. It can contain other organizations as its sub-organizations. An organization acting as a child organization of a top-level organization can also represent departments of a parent corporation. Any suborganization can have one and only one parent organization and the top-most level organization doesn't have any parent organization.

Location

A **location** is a special organization with one and only one parent organization associated with it and no child organization associated. Location must be also associated with one country and might include a region for some countries. Organizations can have any number of locations and suborganizations. Both roles and users can be assigned to organizations (locations or suborganizations). By default, locations and suborganizations inherit permissions from their parent organization via roles.

Community

A **Community** is a special group with a flat structure. It may hold a number of users who share common interests. Thus we can say that a community is a collection of users who have a common interest. Both roles and users can be assigned to a community. A user can also be assigned to a community indirectly through the user's association with an organization or user group.

My Community

My Community is a special community for the current user. It can also have public pages and/or private pages. Similar to the private pages of regular Community, the private pages of the current user's My Community are accessible for the current user and super administrator only unless the default permission is changed.

Public pages

A **public page** is a page in an organization, community, or a user's My Community that can be accessed by guest users. Any user without authentication has access to the public page as long as he/she knows the appropriate URL of a public page. By default, the public page URL has a format of `/web/{site.friendly.url.name}/{page.friendly.url.name}`

Private pages

A **private page** is a page in an organization or community that can only be accessed by users who've logged in and are part of the organization or community. A private page in a user's My Community can be accessed only by the user or the Portal Super Administrator. By default, the private page URL has a format of `/group/{site.friendly.url.name}/{page.friendly.url.name}`

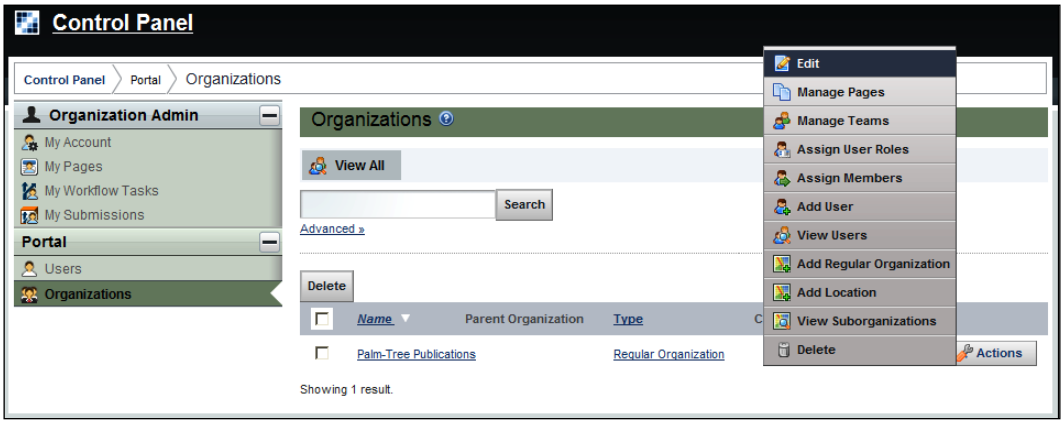
Page Templates

Page Templates (portlet ID 146) allow you to select a page to use and the portlets to be included when creating a page. Administrators may define and edit page templates as well as their permissions.

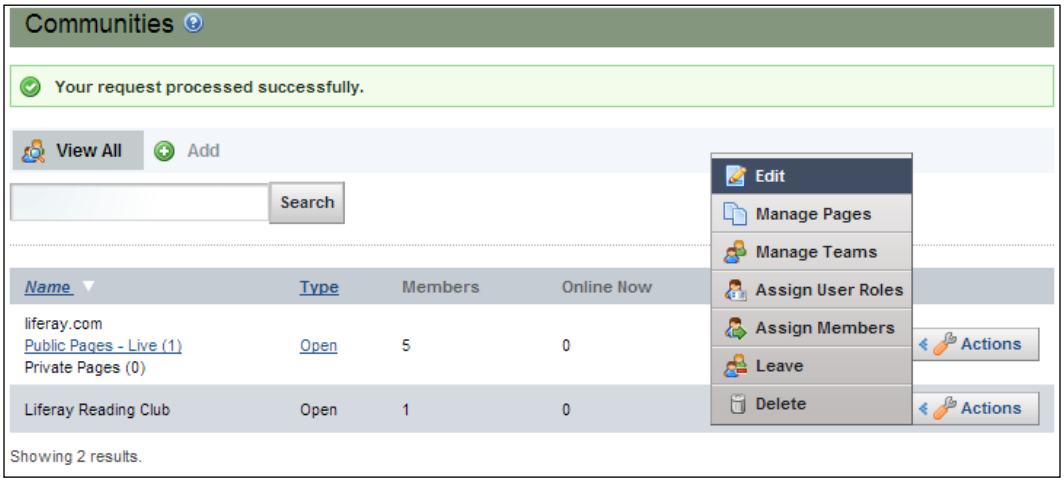
A page template can be applied to a newly created public or private page for the organization, community, My Pages of the current user, My Community of any user with right permissions, and the pages for a user group.

The difference between organization and community

Organizations represent a hierarchy of users, such as a department or subsidiary. Administrators can add a user, manage user membership, assign user roles, manage teams, and set up the attributes of an organization, and have some other capabilities as shown in the options of **Actions** button as shown in the following screenshot.



Communities, on the other hand, are for a set of users with no hierarchy. Administrators can create communities, manage user membership, assign users to community roles, manage teams, and manage public and/or private pages of the community, and have some other capabilities as shown in the options of **Actions** button as shown in the following screenshot



Both organizations and communities can have public and/or private pages. Liferay provides organization roles and community roles for these two groups, respectively.

However, there are some major differences between these two groups. The following list shows some of major ones.

- An organization can have a hierarchy including suborganizations and location while community has independent flat structure without hierarchy.
- A user "belongs" to an organization. This means that the organization administrator is able to add/edit/delete the user's profile.
- On the other hand, a user "joins" a community. This means that the community administrator can only manage (add or remove) the membership through individual users. The community administrator can also add or remove all users in an organization or in a user group through association of an organization or user group to a particular community.
- Organizations have identification fields such as addresses, phone numbers, e-mail addresses, services, and miscellaneous information such as custom fields. Communities don't have such identification and custom fields.

Setting up an organization

Let's quickly go through the typical steps to set up a sample organization named **Palm-Tree Publications**. For more detailed explanation, please refer to *Chapter 2* and *Chapter 3* in Dr. Jonas Yuan's book *Liferay Portal 6 Enterprise Intranets* (PACKT Publishing, May 2010).

Creating an empty Palm-Tree Publications organization

1. Log in as a Super Administrator such as `test@liferay.com/test` or your own login credential.
2. Go to **Control Panel** | **Portal** | **Organizations** | **Add**.
3. Enter **Palm-Tree Publications** in the **Name** field.
4. Keep the default **Regular Organization** in the **Type** field.
5. **Save** to create the new organization.
6. Go through the **Identification** options on the right panel to add addresses, phone numbers, additional e-mail addresses, websites, and so on.

Creating a user as organization administrator

1. Maintain the same Super Administrator login.
2. Go to **Control Panel** | **Portal** | **Organizations** | **View All**.
3. Click on the **Actions** button of the newly created Palm-Tree Publications.
4. Choose **Add User** option.
5. Fill out the form to create a user such as Organization Admin with `orgadmin@test.com` as the e-mail address.
6. Save to create the new user.
7. Change the password for the newly created user.
8. Go through the **Identification** options on the right panel to add addresses, phone numbers, additional e-mail addresses, websites, Instant Messenger, and so on.

Adding the newly created user to organization administrator role

1. Go to **Control Panel** | **Portal** | **Organizations** | **View All**.
2. Click on the **Actions** button of the newly created Palm-Tree Publications.
3. Choose **Assign User Roles** option.
4. Click on the **Organization Administrator** link.
5. Click on the **Available** tab.
6. Check the above newly created user Organization Admin.
7. Click on the **Update Associations** button.

Finishing other configuration for the Palm-Tree Publications organization

1. Log out of the Super Administrator account.
2. Log in as the organization administrator and you will see far fewer functionalities available in the **Control Panel**.
3. Go to **Control Panel** | **Portal** | **Organizations** | **Palm-Tree Publications** | **Actions**, where you can add suborganization, add location, add user, assign members or user roles, manage teams, add pages, and so on.

UI configuration settings for the organization

1. Log in as the organization administrator.
2. Go to **Control Panel** | **Portal** | **Organizations** | **Palm-Tree Publications** | **Actions**.
3. Click on the **Manage Pages** option of **Action** button.
4. Add some public pages and/or private pages.
5. Click on **Look and Feel** under **Public Pages** or **Private Pages**.
6. Select the desired theme. Please note that a different theme can be applied to all public Pages, all private pages, or individually to one particular public or private page.
7. Go to **Settings** | **Logo** tab where you can upload a logo for this organization. Make sure you check **Use logo** checkbox and save the configuration. This logo will be applied to all pages of this organization. Otherwise, the default logo will be applied to this organization.
8. You can also go to **Settings** | **Virtual Host** tab to change the **Virtual Host URL**.

Please note that there are multiple ways to configure an organization. You don't have to follow the previously mentioned steps in an ordered manner.

Similarly, a community can be created and configured. One major difference is that Community Administrator can only add/remove users but can't create/edit user accounts in community. Also, there won't be subcommunity or location in community as you would be able to do so in an organization.

UI and usability features in Liferay Portal 6

Liferay Portal 6 introduces some major UI and usability features such as **Dockbar**, **Page Templates**, and **Site Templates**, among many other UI improvements.

Concise and convenient navigation

As a design best-practice of portal applications, it is recommended that more portal pages be created with fewer portlets on each page. This is to create less crowded portal pages while improving the performance of each page. As a result of this design philology, it is even more necessary to provide a concise and easy navigation system in a portal application. Fortunately, Liferay Portal provides multiple portlets as easy navigation tools.

Dockbar portlet

As shown in the following screenshot, the **Dockbar** is a bar of tools and menus that is shown at the top of every page in a Liferay Portal to every user that is logged in. This newly introduced portlet (portlet ID: 145) is designed to make the most common administration operations more readily accessible and intuitive in Liferay Portal 6.

The main areas of the Dockbar are:

- A red pin, when pressed, makes the Dockbar always visible at the top of the page even when you scroll down the browser window.
- The **Add** menu allows adding new pages or portlets to the current page. It is visible only to users with the appropriate permissions to do such operations.

- The **Manage** menu allows managing the current page, sitemap, site settings as well as going to the Control Panel.
- The **Toggle Edit Controls** checkbox is used to toggle whether the controls to manage the page are shown or hidden. When unchecked, it simulates what a non-administrator user would see on the current page.
- The **Go to** menu allows the user to go to the public and/or private pages of any of the organizations or communities that the current user belongs to, as well as to his/her own public and/or private pages, if available and enabled.
- The current user's profile image is displayed, followed by the full name with a link to go to the user's profile page.
- The **Sign Out** link allows the user to log out. When an administration is impersonating another user, the user name becomes a menu that allows the administrator to switch between the impersonated user and the administrator own account.

This is a system portlet and can't be added to a page through **Add Application** panel.

Multiple levels of navigation menus

Liferay Portal allows users with the appropriate permission to create portal pages and child pages. The second level child page will be displayed as a level 2 navigation menu. Liferay Classic theme supports two levels of navigation menus. Of course, the theme to display the navigation menus needs to support it if two or more levels of navigation are desired.

Breadcrumb portlet

The **Breadcrumb** portlet (portlet ID: 73) displays a trail of parent pages for the current page to let users know where they are and visually guide them through continuing pages. It can be placed on public portal pages as a navigational aid when using Liferay to publish websites.

Site Map portlet

The **Site Map** portlet (portlet ID: 85) displays a structured directory of links to all pages in the portal so that it can be used to navigate directly to any page on the site. It can be configured to display the entire site or a subsection of pages.

Navigation portlet

The **Navigation** portlet (portlet ID: 71) shows a menu of pages to navigate to them. Its configuration UI allows selecting different combinations of navigation style. Portlet content is scoped to the present organization or community and the specific page it appears on (depending on display style) and cannot be altered. What appears within the portlet is dynamic based on the pages which exist for the site (there does not appear to be anyway to filter the pages displayed). Hidden pages are excluded from the list.

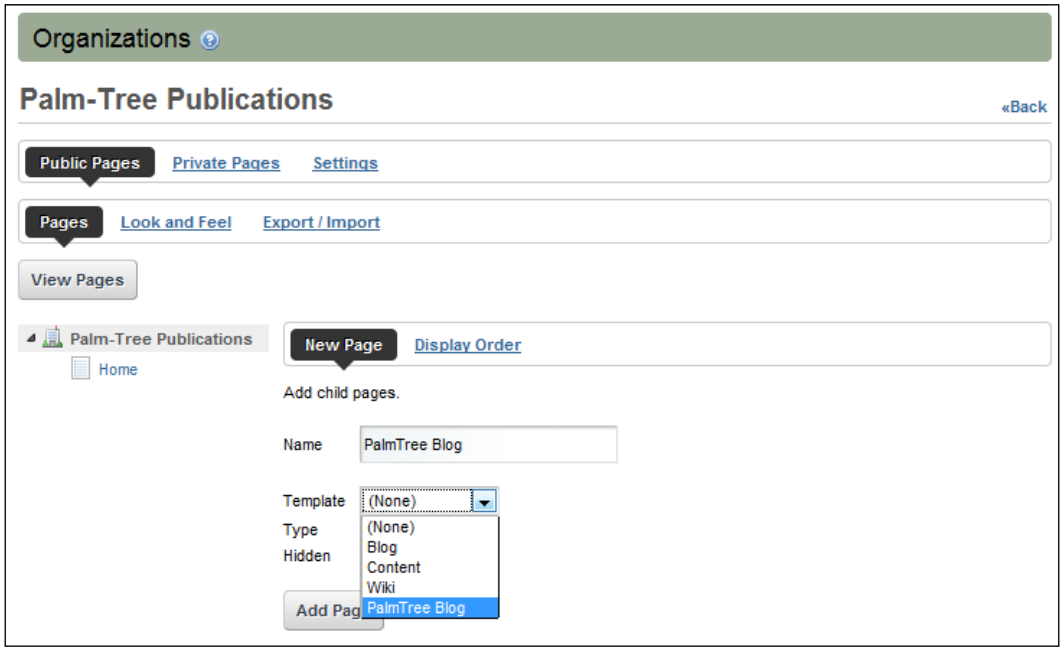
Easy page creation based on Page Template

The newly introduced **Page Templates** in Liferay Portal 6 allows you to select a page to use and portlets to be included when creating a page. Administrators may, among other actions:

- Define and edit a page template
- Localization of page name
- Check and uncheck the page template as Active
- Define the page permissions
- Apply a layout template for this page template
- Add and configure one or multiple portlets on this page template
- Delete an existing page template

Now when a user with the right permissions creates a new public or private page, all available active page templates will be displayed in the **Template** drop-down as shown in the following screenshot so that the user can choose the desired page template for the new page to be created.

Once the **Add Page** button is clicked, the newly created page will have the same configuration as the page template, so the user doesn't have to go through multiple steps of configuration again. Of course, the user can also modify the newly created page without affecting the original page template on which this new page is based. This page template feature significantly reduces the steps to create same or similar pages in multiple organizations and communities.



Easy organization or community creation based on Site Template

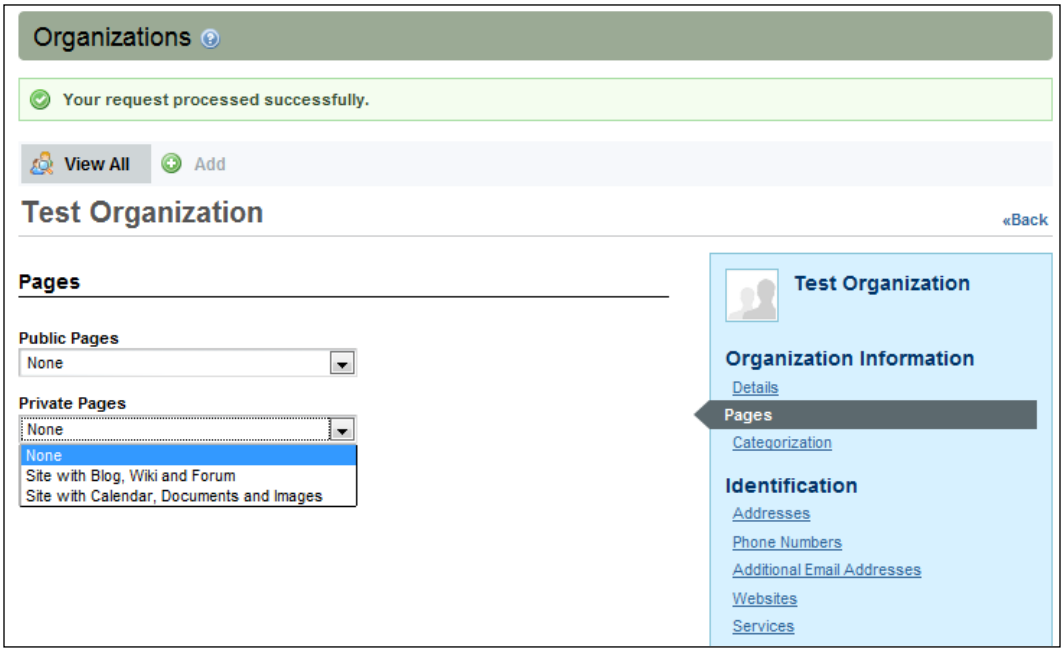
The newly introduced **Site Templates** in Liferay Portal 6 allow you to define pages and web content to be included when creating organizations or communities.

Administrators may take actions such as:

- Define and edit a site template.
- Localization of site template name.
- Check and uncheck the site template as Active.
- Define the site template permissions.
- Manage pages of the site template. The pages for the site template can be created based on the page template. Look and feel such as layout template can also be applied to the pages as part of the site template.

- Configuration of the site template including layout template, portlets, and so on.
- Delete an existing site template.

Now when a user with right permission creates pages for a new organization, all available active site templates will be displayed in both **Public Pages** and **Private Pages** drop downs as shown in the following screenshot so that the user can choose the desired site template for the new public and/or private pages of the organization.



Similarly, when a user with right permission creates a new community, all available active site templates will be displayed in both **Public Pages** and **Private Pages** drop downs so that the user can choose the desired site template for the new public and/or private pages of the community.

This site template feature significantly reduces the number of steps required to create and configure public and/or private pages of organizations and communities because the administrators while creating new site now have the option of selecting the desired site template and then pre-populate the site with pages including portlets in a preconfigured layout. Any unwanted portlet on any of the pre-populated pages can easily be removed.

Internationalization (i18n) and Localization (L10n)

Internationalization (i18n) and **localization (L10n)** are computing terms related to adapting software to different languages and regional differences. Internationalization is the process of designing a software application so that it can be adapted to various languages and regions without engineering changes. Localization is the process of adapting internationalized software for a language or a specific region by adding locale-specific components and translating text.

Liferay Portal supports both internationalization and localization out-of-box.

The following i18n-related Java settings are from `system.properties`, which is packaged in `portal-impl.jar`. Please read the comments below for an explanation.

```
#
# The file encoding must be set to UTF-8 in order for the
# internationalization to work correctly.
#
file.encoding=UTF-8

#
# Java uses the underlying operating system to generate
# images. If you are using Unix and do not start the portal in
# a X Windows session, then Java will not know how to generate
# images and you'll get lots of nasty exceptions. Setting this #
property to true will fix that. Sometimes this property
# cannot be set dynamically when the server starts and you'll
# need to edit your start script to include this as a system
# property.
#
java.awt.headless=true

#
# Set the default locale used by Liferay. This locale is no
# longer set at the VM level. See LEP-2584.
#
user.country=US
user.language=en

#
# Set the default time zone used by Liferay. This time zone is
# no longer set at the VM level. See LEP-2584.
#
user.timezone=UTC
```

The values of these settings can be overwritten in `$(PORTAL_ROOT_HOME}\WEB-INF\classes\system-ext.properties`. For example, you can change the default language and default country to German and Germany respectively, as shown in the following code snippet:

```
user.country=DE
user.language=de
```

Liferay is designed to handle as many or as few languages as you want to support. Liferay Portal 6 supports over 30 different languages and 35 different locales out-of-box and the numbers are still increasing. Support of multiple languages and locales is implemented at different levels including:

- Database
- Portal Framework
- Portlet GUIs and Contents

Database configuration to support Liferay localization

To support multiple languages, the database for Liferay Portal needs to be configured to support UTF-8 encoding. All major relational databases including Oracle, MySQL, SQL Server, DB2, and so on are supported in Liferay. You should refer to your own database for UTF-8 support.

For example, you can use the following commands to create a MySQL database named `lportal` for Liferay and verify the encoding as highlighted below.

```
mysql> create database lportal character set utf8 collate utf8_bin;
mysql> use lportal;

mysql> status;
--------------
mysql  Ver 14.14 Distrib 5.1.44, for Win32 (ia32)

Connection id:          3
Current database:       lportal
Current user:           root@localhost
SSL:                    Not in use
Using delimiter:        ;
Server version:         5.1.44-community MySQL Community Server (GPL)
Protocol version:       10
Connection:             localhost via TCP/IP
```

```
Server characterset:    utf8
Db     characterset:    utf8
Client characterset:    utf8
Conn.  characterset:    utf8
TCP port:               3306
Uptime:                 45 min 51 sec

Threads: 1  Questions: 12  Slow queries: 0  Opens: 15  Flush tables: 1
Open tables: 0  Queries per
second avg: 0.4
--------------

mysql>
```

You then specify the database connection in `${PORTAL_ROOT_HOME}\WEB-INF\classes\portal-ext.properties` for MySQL database:

```
jdbc.default.driverClassName=com.mysql.jdbc.Driver
  jdbc.default.url=jdbc:mysql://localhost/lportal?useUnicode=true&char
acterEncoding=UTF-8&useFastDateParsing=false

jdbc.default.username=dbusername
jdbc.default.password=dbpassword
```

You will need to change the above highlighted database URL, username, and password to reflect your own MySQL database settings. Please refer to `portal.properties` for more database configuration for other databases such as Oracle, SQL server, DB2, and so on.

Localization in the portal framework

The locale is the combination of language code and country code. The following setting in `portal.properties` specifies the available locales in Liferay Portal:

```
locales=ar_SA,eu_ES,bg_BG,ca_AD,ca_ES,zh_CN,zh_TW,cs_CZ,nl_NL,en_
US,et_EE,fi_FI,fr_FR,gl_ES,de_DE,el_GR,iw_IL,hi_IN,hu_HU,in_ID,it_
IT,ja_JP,ko_KR,nb_NO,fa_IR,pl_PL,pt_BR,pt_PT,ru_RU,sk_SK,es_ES,sv_
SE,tr_TR,uk_UA,vi_VN
```

The portal administrator can view these locales by going to the **Control Panel | Settings | Display Settings | Available Languages**. The default language in the portal instance is displayed in the **Default Language** drop-down on the same page. These languages will also be displayed in **Language** portlet as corresponding national flags.

Each user in the portal can switch his/her own default language setting on the **Control Panel** | **My Account** | **Display Settings** | **Language** page.

Messages corresponding to a specific language are specified in properties files with file names matching that of `content/Language_*.properties`. These language properties files are packaged in `${PORTAL_ROOT_HOME}\WEB-INF\lib\portal-impl.jar`. These messages can also be overridden in properties files with file names matching that of `content/Language-ext_*.properties`. Use a comma to separate each entry. This way, when a portal page is loaded, Liferay will detect the language that user selected, pull up the corresponding language properties file, and display the text in the correct language.

When a user signs in to the portal site, the out-of-box features such as Dockbar, Control Panel, and Liferay out-of-box portlets on the site will be displayed in the user's default language, if none is set, then the portal default language. The custom theme and portlets need to support the selected language in order to display accordingly.

Liferay also provides the **Language** portlet for the user to reset his/her default language.

Setting up a unique URL for different languages

Liferay allows the user to provide a unique URL for a specific language via **I18nServlet**.

For example, the URL at `http://localhost:8080/en_US/web/guest/home` displays the English localization of the Home page of Guest community while the URL at `http://localhost:8080/pt_BR/web/guest/home` displays the Brazil Portuguese localization of the same page. These servlet mappings are implemented in `${PORTAL_ROOT_HOME}\WEB-INF\web.xml`, as shown in the following code:

```
<servlet>
   <servlet-name>I18n Servlet</servlet-name>
   <servlet-class>com.liferay.portal.servlet.I18nServlet</servlet-
class>
   <load-on-startup>2</load-on-startup>
</servlet>
...
<servlet-mapping>
   <servlet-name>I18n Servlet</servlet-name>
   <url-pattern>/en_US/*</url-pattern>
</servlet-mapping>
...
<servlet-mapping>
   <servlet-name>I18n Servlet</servlet-name>
   <url-pattern>/pt_BR/*</url-pattern>
</servlet-mapping>
```

Localization in custom portlets

Liferay out-of-box portlets such as **Calendar** support the available languages in the portal framework.

The portlet engineer can take the following steps to enable multiple language support in your custom protlet. Here we are going to create a simple JSP sample portlet to enable both English and Brazil Portuguese. This sample portlet is created in Liferay Plugins SDK.

1. Open Liferay Plugins SDK console.
2. Navigate (`cd`) to `portlets` folder.
3. Run the following command to create a sample portlet skeleton:

   ```
   create palmtree-language-sample "Palm-Tree Multiple Language
   sample portlet"
   ```

4. Navigate (`cd`) to `${liferay.plugins.sdk}\portlets\palmtree-language-sample-portlet\docroot\WEB-INF` folder.
5. Create a file named `liferay-hook.xml` to support both English and Brazil Portuguese

   ```
   <?xml version="1.0" encoding="UTF-8"?>
   <!DOCTYPE hook PUBLIC "-//Liferay//DTD Hook 6.0.0//EN" "http://
   www.liferay.com/dtd/liferay-hook_6_0_0.dtd">

   <hook>
      <language-properties>content/Language_en_US.properties</
   language-properties>
      <language-properties>content/Language_pt_BR.properties</
   language-properties>
   </hook>
   ```

6. Navigate (`cd`) to `${liferay.plugins.sdk}\portlets\palmtree-language-sample-portlet\docroot\WEB-INF` folder.
7. Run the following command:

   ```
   mkdir src\content
   ```

8. Navigate (`cd`) to `${liferay.plugins.sdk}\portlets\palmtree-language-sample-portlet\docroot\WEB-INF\src\content` folder.
9. Create three language properties files named `Language.properties`, `Language_en_US.properties`, and `Language_pt_BR.properties`.

10. Open `Language.properties` file and add the following line:

```
palmtree-language-sample-display-text=This is a sample display
text in default English
```

11. Open `Language_en_US.properties` file and add the following line:

```
palmtree-language-sample-display-text=This is a sample display
text in English
```

12. Open `Language_pt_BR.properties` file and add the following line. Please note that the Portuguese text below is from Google Translator.

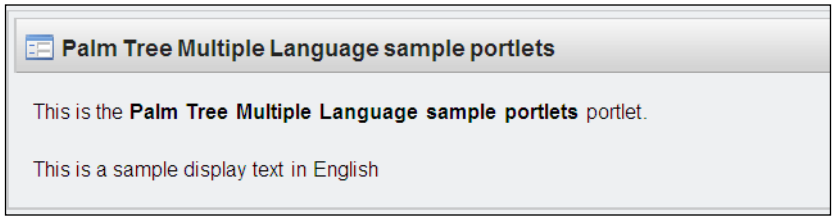
```
palmtree-language-sample-display-text=Este é um texto de exibição
de amostra em Português
```

13. Open `${liferay.plugins.sdk}\portlets\palmtree-language-sample-portlet\docroot\view.jsp` and add the following lines:

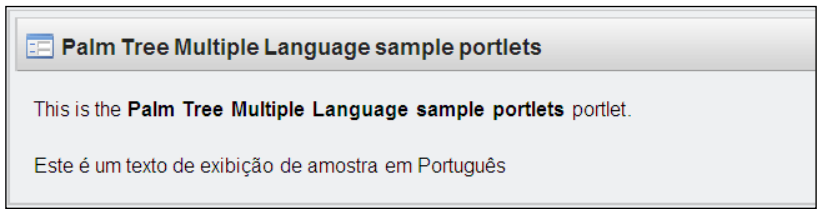
```
<%@ taglib uri="http://java.sun.com/portlet_2_0" prefix="portlet"
%>
<%@ taglib uri="http://liferay.com/tld/ui" prefix="liferay-ui" %>

<portlet:defineObjects />

This is the <b>Palm Tree Multiple Language sample portlets</b>
portlet.

<br><br>
<liferay-ui:message key="palmtree-language-sample-display-text" />
```

14. Navigate (`cd`) to `${liferay.plugins.sdk}\portlets\palmtree-language-sample-portlet` folder.
15. Run command "`ant`" to build and package the portlet WAR file.
16. Copy the generated `palmtree-language-sample-portlet-<version>.war` file from `${liferay.plugins.sdk}\dist` folder to your Liferay Portal `deploy` folder.
17. Start your Liferay Portal server.
18. Log in as the Portal Administrator and add the above portlet to your page.

19. Use the **Language** portlet to select English. As shown in the following screenshot, you will see the sample portlet displays the text in English, which is from `Language_en_US.properties` file:


Palm Tree Multiple Language sample portlets
This is the Palm Tree Multiple Language sample portlets portlet.
This is a sample display text in English

20. Use the **Language** portlet to select Brazil Portuguese. As shown in following the screenshot, you will see the sample portlet displays the text in Portuguese, which is from `Language_pt_BR.properties` file:


Palm Tree Multiple Language sample portlets
This is the Palm Tree Multiple Language sample portlets portlet.
Este é um texto de exibição de amostra em Português

This sample portlet shows how easy it is to add multiple language support to your custom portlet. Actually, the best practice is that all display texts within the custom portlet such as portlet title, tab names, table headers, field label names, field descriptions, error messages, button names, display texts, and so on should be added to corresponding language bundle properties files instead of being hard-coded in the portlet's frontend files (View in the MVC model) such as view.jsp. We will discuss this topic in more detail later in this book when we explain the Liferay tag library.

Java can read Unicode characters or latin1 characters only. To support non-unicode characters such as Arabic, Japanese, and Chinese, you can write a `Language_*.properties.native` file such as `Language_zh_CN.properties.native` for Simplified Chinese that uses the native language in the value. You can then use a native to ASCII converter to convert a file with native-encoded characters to one with Unicode-encoded characters. A popular converter is ascii2converter. You can find more details at `http://java.sun.com/j2se/1.5.0/docs/tooldocs/solaris/native2ascii.html`.

This approach to maintaining display texts in language properties files has many benefits, including:

- It supports as many languages as needed in your portlet
- It separates the language display texts from the portlet codes so language translators and portlet engineers can work independently on the same portlet
- It makes it possible to change the display texts without changing the portlet source code

Localization through configuration and customization

As we have already discussed, Liferay Portal 6 supports over 30 different languages and 35 locales out-of- box. There are some tools such as **Language** portlet for users to switch to different language and set the default language. Now we will explain how multiple language support can be changed through configuration or customization.

Remove languages that are not needed

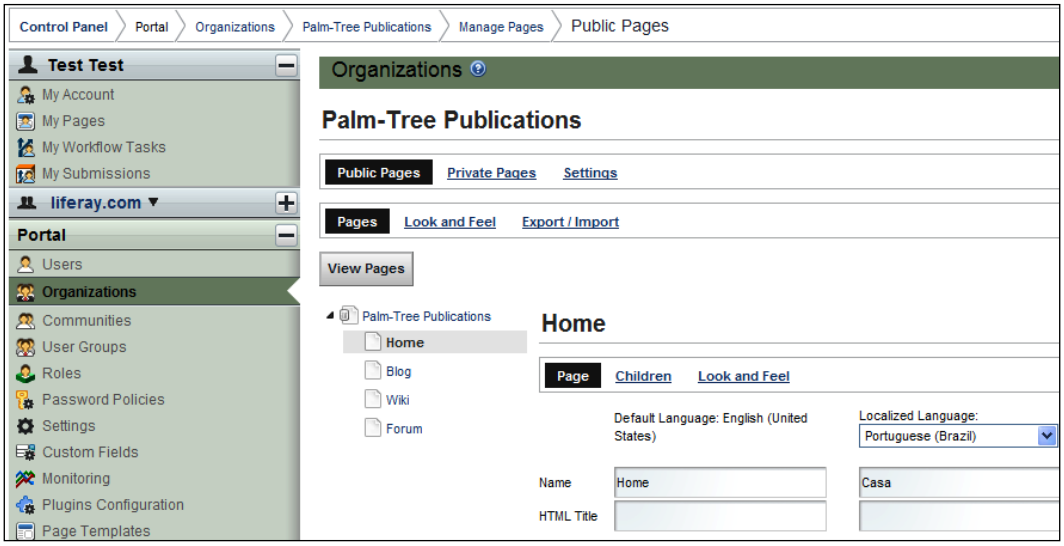
You can remove all unwanted locales from your portal application if you just need to keep a few languages in your portal application. For example, an administrator can just keep Simplified Chinese, English, and Brazil Portuguese by setting the following three locales in **Control Panel** | **Settings** | **Display Settings** | **Available Languages** field:

```
zh_CN,en_US,pt_BR
```

Once the portal is configured to keep the three languages as the above example, all other languages will be removed from the **Language** portlet and other language selection drop-down such as on the **Edit** page of **Web Content** porltet. Please note that other languages are still accessible through a unique URL such as `http://localhost:8080/de_DE/web/guest/home` although `de_DE` is not one of the locales set in the **Control Panel**. If you really would like to disable those unneeded languages so that they are not accessible from the unique URL, you can delete corresponding **I18nServlet** servlet mapping from `${PORTAL_ROOT_HOME}\WEB-INF\web.xml` as explained earlier in this chapter.

Localization of page names in the navigation menus

Liferay has built-in support for localization of navigation menus (page names). This is done in the **Localized Language** drop-down and related fields in the **Manage Pages** section of an organization or community in the **Control Panel**, as shown in the following screenshot:



Localization of page names in Breadcrumb portlet

After the page names of an organization or community have been localized as shown in above section, the page names in **Breadcrumb** are localized correspondingly.

Localization of portlet title

The titles of Liferay out-of-box portlets have been localized. To localize the titles of your custom portlets, you need to assign the localized portlet title text to a property named `javax.portlet.title.{portlet_id}` such as the one below in your corresponding language properties files packaged in your custom portlets. You can also add the localization of the portlet description to the language properties files as well.

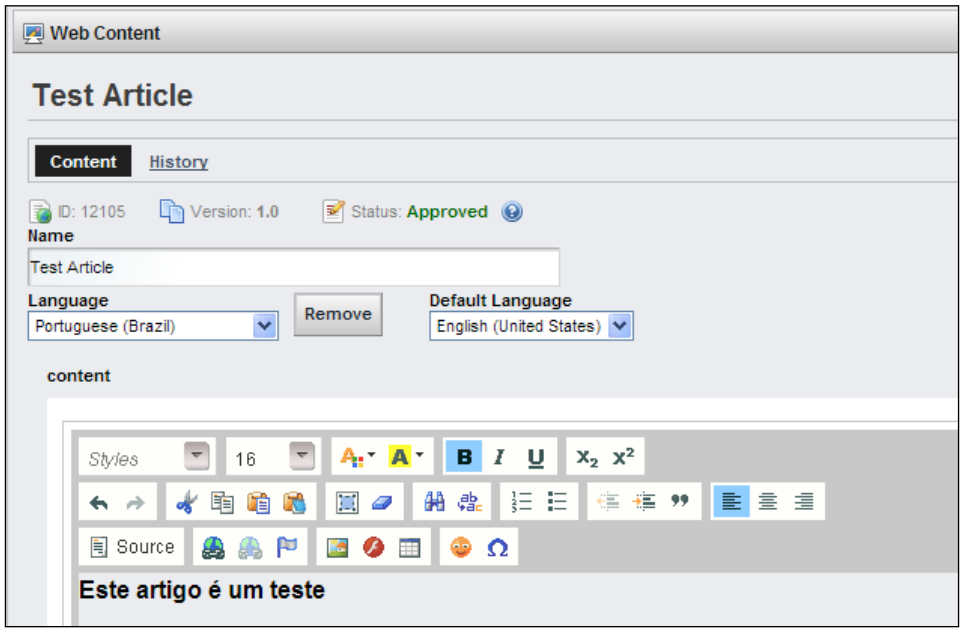
```
javax.portlet.title.palmtree-language-sample=Palm-Tree Multiple
Language support portlet
javax.portlet.description.palmtree-language-sample=Palm-Tree Multiple
Language support portlet
```

Where `palmtree-language-sample` is the `portlet-name` as available in the `portlet.xml` file. You need to change it to your custom portlet name accordingly.

Localization of web contents

Liferay has built-in support for localization of web contents in some of the out-of-box portlets such as **Web Content** portlet.

A user needs to create a new article with contents in the default language first and save it. The user can then edit the article, select a different language in the **Language** drop down, and then add the localized content by using the WYSIWYG online editor as shown in the following screenshot:



Please note that only the article **content** (body) can be localized while the article title, abstract, category, and/or tag names are not localizable in the out-of-box Liferay Portal.

To support the localization of these fields, you need to update the related database tables such as the `title` column in Liferay `journalarticle` table and corresponding APIs so that the localized title and abstract can be saved in the database as XML format in the same way as the localized article body is persisted in the `content` column.

A sample database entry that supports content in both English and Brazil Portuguese is shown in the following code snippet:

```
<?xml version='1.0' encoding='UTF-8'?><root available-locales=""en_
US,pt_BR,"" default-locale=""en_US""><static-content language-
id=""en_US""><![CDATA[<p>This is a test article</p>]]></static-
content><static-content language-id=""pt_BR""><![CDATA[<p><span
style=""font-size: 16px""><strong>Este artigo é um teste</strong></
span></p>]]></static-content></root>
```

UI customizations

Liferay Portal provides some out-of-box powerful UI mashup functionalities. To build a more visually appearing portal application, however, it is always desirable to make some UI customizations because mashup through configuration itself might not be enough in some cases. Fortunately, Liferay's presentation layer can be easily changed through configuration or customization at different levels.

Changing the default theme

Liferay theme builder allows for the generation of hyphenated theme IDs such as the following one in `liferay-look-and-feel.xml` file of the theme:

```
<theme id="palm-tree" name="Palm-Tree Publications Theme" />
```

Upon loading the extensible property `default-regular-theme-id`, utility routines will sweep the name of special characters because `default-regular-theme-id` requires JavaScript safe string (no hyphen, no dash). This causes problems for default theme IDs that contain hyphens. See more details in Liferay JIRA ticket at `http://issues.liferay.com/browse/LEP-6725`.

The following code from `ThemeLocalServiceImpl.java` shows how the theme ID is modified during theme registration:

```
<pre>
String themeId = theme.attributeValue("id");

if (servletContextName != null) {
themeId = themeId + PortletConstants.WAR_SEPARATOR +
              servletContextName;
}

themeId = PortalUtil.getJsSafePortletId(themeId);

</pre>
```

For example, if your theme ID is "palm-tree" and theme war is identified as "palm-tree-theme-<version_number>.war", the default-regular-theme-id entry will be set as "palmtree_WAR_palmtreetheme" in the themeId column of Liferay layoutset database table.

To change the default theme across the system, the following entry can be added to portal-ext.properties file so when a new organization or community is created, this custom Palm-Tree Publications Theme will be used for newly created public and private pages. Please note that any existing page will keep the old default theme.

```
#
# Set the default theme id for regular themes.
#
default.regular.theme.id=palmtree_WAR_palmtreetheme
```

Similarly, you can overwrite the following default theme IDs for **WAP** (Wireless Application Protocol for wireless device) and **Control Panel**:

```
# Set the default theme id for wap themes.
default.wap.theme.id=mobile

# Set the theme of the Control Panel layout
control.panel.layout.regular.theme.id=controlpanel
```

Changing the default layout

Liferay Portal sets multiple layout related default settings in portal.properties file. One of the common configurations is to change the default layout template ID for all newly created portal pages across your Liferay portal site. For example, you can add the following line to your portal-ext.properties to set a layout template with ID of 1_3_columns:

```
layout.default.template.id=1_3_columns
```

Please note that it is widely believed in the Liferay community that the following line does the job. However, it has been verified that this doesn't work as expected and you need to use the property name instead.

```
default.layout.template.id=1_3_columns
```

Customization of Dockbar

As explained earlier in this chapter, **Dockbar** menus are rendered by Dockbar portlet's `${PORTAL_ROOT_HOME}/html/portlet/dockbar/view.jsp`. This Dockbar and its functions can be added, deleted, or modified through permission configuration or customizations.

Adding or removing the Dockbar from a theme

The Dockbar menu has been added to the default `Classic` theme for signed in users as shown in the following code in `${PORTAL_ROOT_HOME}/html/themes/classic/templates/portal_normal.vm`:

```
#if($is_signed_in)
   #dockbar()
#end
```

You can remove the Dockbar menu from the Classic theme by deleting or commenting out the above lines. However, you might have to implement some of the menus in the Dockbar somewhere else in order to provide access to some of the key administrative tools for your users.

You can also add the Dockbar menu to your custom theme by adding the above lines of codes to the `portal_normal.vm` file in your custom theme.

Adding or removing functionalities in the Add option in Dockbar

By default, `portal.properties` includes the following line to set the portlet IDs that will be shown directly in the **Add Application** menu in Dockbar:

```
dockbar.add.portlets=56,101,110,71
```

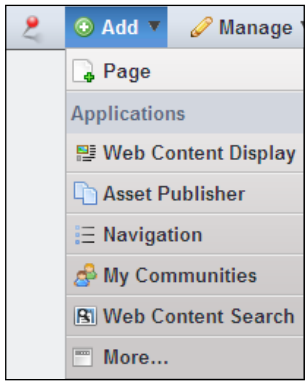
Where these portlet IDs represent the following portlets:

- `56`: Web Content Display
- `101`: Asset Publisher
- `110`: Document Library Display
- `71`: Navigation

You can customize this list of available portlets directly under the Dockbar's **Add** menu without going to the **Add Application** pop-up panel through **Add** | **More...** in the Dockbar. For example, you can add the following line to your `portal-ext.properties` file:

```
dockbar.add.portlets=56,101,71,29,77
```

This is to remove portlet ID 110 (**Document Library Display**) and add portlet IDs 29 (**My Communities**) and 77 (**Web Content Search**) to the list. After the server is restarted, you should be able to login and see the **Add** menu in Dockbar has been customized with the above configuration change as shown in the following screenshot. The portlet names displayed in the list are in the same order as the portlet IDs are added to the `dockbar.add.portlets` setting in `portal.properties` or `portal-ext.propteries`, which overwrites the same setting in `portal.properties`.



Adding language selection to the Dockbar

The Liferay **Language** portlet is available for user to select a different language as the user's default language and apply it immediately across the site for the user. From the usability point of view, however, it is desirable to add language selection flags in the Dockbar area.

This can be accomplished by customizing the `view.jsp` of **Dockbar** portlet through Liferay hook plugin as following:

1. Open Liferay Plugins SDK console.
2. Navigate to the `hooks` folder.
3. Run the following command to create a sample portlet skeleton:

   ```
   create palmtree-dockbar "Palm-Tree Dockbar Language hook"
   ```

4. Navigate (`cd`) to `${liferay.plugins.sdk}\hooks\palmtree-dockbar-hook\docroot\WEB-INF` folder.
5. Open `liferay-hook.xml` file.
6. Add the following highlighted line between the `<hook>` and `</hook>` tags

   ```
   <hook>
   <custom-jsp-dir>/WEB-INF/jsps</custom-jsp-dir>
   </hook>
   ```

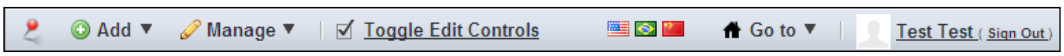
7. Go back to `${liferay.plugins.sdk}\hooks\palmtree-dockbar-hook\docroot\WEB-INF` folder.
8. Run the following command to create a folder and some subfolders:

   ```
   mkdir jsps\html\portlet\dockbar
   ```

9. Navigate (`cd`) to `jsps\html\portlet\dockbar` folder.
10. Copy `${PORTAL_ROOT_HOME}\html\portlet\dockbar\view.jsp` to `${liferay.plugins.sdk}\hooks\palmtree-dockbar-hook\docroot\WEB-INF\jsps\html\portlet\dockbar` folder.
11. Open the `view.jsp` in your preferred editor.
12. Add the following highlighted lines between **Toggle Edit Control** and **Go to** drop-down menus. This is to add English, Brazil Portuguese, and Simplified Chinese to the Dockbar menu. You can add more languages or change them to different languages in `languageIds` String array in the highlighted lines.

```
<c:if test="<%= !group.isControlPanel() && themeDisplay.
isSignedIn() %>">
   <li class="toggle-controls" id="<portlet:namespace
/>toggleControls">
      <a href="javascript:;">
         <liferay-ui:message key="toggle-edit-controls" />
      </a>
   </li>
</c:if>

<li style="margin-left: 50px;">
   <liferay-ui:language displayStyle="0" languageIds='<%= new
String[]{"en_US","pt_BR","zh_CN"} %>' />
</li>

<c:if test="<%= group.isControlPanel() %>">
```

13. Build and package the hook WAR file and deploy it on your Liferay server.
14. Login and you should be able to see that the three language flags have been added to the Dockbar menu as shown in the following screenshot. You might have to refresh your browser multiple times in order to view the correct language selection flags.



15. Now users can use the language selection flags in the Dockbar to reset their default language as they wish.

Changing the logo in the header

The most common change in the header is to apply a custom logo to replace the default Liferay logo. This can be done at two different levels.

First, you can change the logo at organization or community level. This can be accomplished at steps below:

1. Log in as the Super Administrator, Organization Administrator, or community administrator.
2. Go to **Control Panel** | **Portal** | **Organizations** (or **Communities**) | Your targeted organization (such as Palm-Tree Publications) or community | **Actions** | **Manage Pages** .
3. Click on the **Settings** tab.
4. Click on **Browse…** button to upload your desired logo.
5. Check **Use Logo** checkbox.
6. Click on **Save**.

Now you can go to the public and/or private pages of this organization or community to verify that the new logo has been applied to the site correctly.

Secondly, you can change the logo at the portal system level if you would like to use the same custom logo for all organizations and communities in this Liferay instance. This can be accomplished at steps below:

1. Login as the Super Administrator.
2. Go to **Control Panel** | **Settings** | **Display Settings**.
3. Uncheck **Allow community administrators to use their own logo?** if you don't allow the communities to have different logos.
4. Click on the **Change** link under the default Liferay logo.
5. Click on the **Browse…** button on the pop-up page to upload your desired logo and save your change.
6. You will notice that your custom logo has been uploaded successfully.
7. Go to all organizations and communities to verify this logo change.

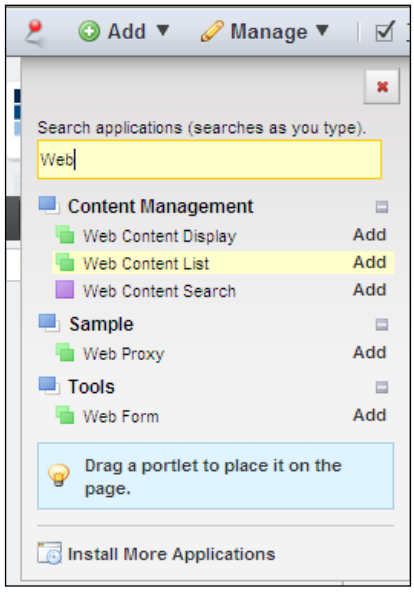
The logo is rendered as part of the theme used on the page. For example, the following block of code in Liferay default `Classic` theme does the job:

```
<h1 class="company-title">
   <a class="logo" href="$company_url" title="#language("go-to")
$company_name">
      <span>$company_name</span>
   </a>
</h1>
```

Customization of Add Application pop-up panel

Liferay Portal provides Add Application pop-up page for users with right permission to add portlets to a portal page. This Add Application pop-up page is to list available portlets in different categories. It also provides AJAX like search features. A user with the right permissions can click on **Add** link or drag-and-drop the desired portlet to a targeted layout area of a portal page.

As shown in the following screenshot, the **Add Application** pop-up panel is accessible from the Dockbar's **Add** | **More...** option:



Registering portlets in a custom category on Add Application pop-up page

One common practice is to display some portlets in a custom category such as **Palm Tree Publications**. This can be done as shown in the sample below.

Open the `liferay-display.xml` file in your custom portlet folder, add a new `category.palmtree.publications` category, and include the portlet ids of the portlets that should be under this category.

```
<category name="category.palmtree.publications">
   <portlet id="ServiceDesk" />
   <portlet id="MyBook" />
</category>
```

As `category.palmtree.publications` is a new category name, you need to add this in the language resource bundle files such as `language.properties` and `language_en_US.properties` in your custom portlet folder:

```
#Add Application (Gadget)
category.palmtree.publications=Palm Tree Publications
```

Also, you need to use the Liferay hook technology to add your language properties files. Now build and deploy your portlet WAR file and you should be able see both `ServiceDesk` and `MyBook portlets` are under **Palm Tree Publications** category on the **Add Application** pop-up page.

Removing some out-of-box portlets in Lifery Portal

Some of the out-of-box Liferay portlets can be completely removed from the registration in Liferay Portal. This can be done in the following files:

- `${PORTAL_ROOT_HOME}/WEB-INF/portlet-custom.xml`
- `${PORTAL_ROOT_HOME}/WEB-INF/liferay-portlet.xml`
- `${PORTAL_ROOT_HOME}/WEB-INF/liferay-display.xml`

For example, you can remove the **Loan Calculator** portlet (portlet ID: 61) by taking the following steps:

1. Comment out the following section in `${PORTAL_ROOT_HOME}/WEB-INF/portlet-custom.xml`

```
   <!--
   <portlet>
<portlet-name>61</portlet-name>
      <icon>/html/icons/loan_calculator.png</icon>
      <struts-path>loan_calculator</struts-path>
      <restore-current-view>false</restore-current-view>
      <private-request-attributes>false</private-request-
attributes>
      <private-session-attributes>false</private-session-
attributes>
      <render-weight>50</render-weight>
      <css-class-wrapper>portlet-loan-calculator</css-class-
wrapper>
   </portlet>
   -->
```

2. Comment out the following section in `${PORTAL_ROOT_HOME}/WEB-INF/liferay-portlet.xml`

```
<!--
<portlet>
   <portlet-name>61</portlet-name>
   <icon>/html/icons/loan_calculator.png</icon>
   <struts-path>loan_calculator</struts-path>
   <restore-current-view>false</restore-current-view>
   <private-request-attributes>false</private-request-
attributes>
   <private-session-attributes>false</private-session-
attributes>
   <render-weight>50</render-weight>
   <css-class-wrapper>portlet-loan-calculator</css-class-
wrapper>
</portlet>
-->
```

3. Comment out the following section in `${PORTAL_ROOT_HOME}/WEB-INF/liferay-display.xml`

```
<!--
<portlet id="61" />
-->
```

If you wish, you can also remove other source codes such as the unneeded portlets in `${PORTAL_ROOT_HOME}/html/portlet` folder

After the server is restarted, this **Loan Calculator** portlet is not registered in Liferay and won't be available for any users, including administrator, to add to a page.

Disabling some out-of-box portlets in Liferay Portal

Each portlet can be disabled by unchecking the **Active** checkbox on **Control Panel | Plugins Configuration |** targeted portlet page. If disabled, the portlet will not be displayed in the **Add Application** pop-up panel.

Each portlet can also be disabled by setting `show-portlet-inactive` to `false` as shown in the highlighted line in its corresponding section in `${PORTAL_ROOT_HOME}/WEB-INF/liferay-portlet.xml`

```
<portlet>
   <portlet-name>49</portlet-name>
   <icon>/html/icons/default.png</icon>
   <struts-path>my_places</struts-path>
   <use-default-template>false</use-default-template>
```

```
        <show-portlet-access-denied>false</show-portlet-access-denied>
        <show-portlet-inactive>false</show-portlet-inactive>
        <restore-current-view>false</restore-current-view>
        <private-request-attributes>false</private-request-attributes>
        <private-session-attributes>false</private-session-attributes>
        <render-weight>50</render-weight>
        <add-default-resource>true</add-default-resource>
        <system>true</system>
    </portlet>
```

This `show-portlet-inactive` setting can be overwritten by the Active checkbox setting in previous step.

Hiding a portlet when a user doesn't have the required permission

Role-based access is one of the key features in Liferay Portal. When it comes to portlets, we can deploy multiple portlets on the same portal page. Users with different roles might see different contents rendered in different number of portlets on the same page and this is controlled by role-based permission.

If a user doesn't have the appropriate permissions from his/her role(s) to view a particular portlet, a message like **Application Portlet is temporarily unavailable!** will be displayed in the portlet.

The question is: How can I control portlet availability/visibility depending on the roles and not to show this type of message for users without right role to view the portlet?

This can be done at system level by adding the following entry in `portal-ext.properties` file:

```
layout.show.portlet.access.denied=false
```

When it comes to an individual portlet, this above setting will be overwritten by the portlet's own setting as shown in the highlighted line below in the `liferay-portlet.xml` file:

```
    <portlet>
        <portlet-name>8</portlet-name>
        <icon>/html/icons/calendar.png</icon>
        <struts-path>calendar</struts-path>
        ...
        <control-panel-entry-weight>5.0</control-panel-entry-weight>
        <preferences-unique-per-layout>false</preferences-unique-per-
layout>
```

```
        <use-default-template>false</use-default-template>
        <show-portlet-access-denied>true</show-portlet-access-denied>
        <show-portlet-inactive>true</show-portlet-inactive>
        <restore-current-view>false</restore-current-view>
        <scopeable>true</scopeable>
        …
    </portlet>
```

Set the `show-portlet-access-denied` value to `true` if users are shown the portlet with an access denied message if they do not have access to the portlet. If this is set to `false`, users are not shown the portlet as they do not have access to the it. The default value has been set to `true` in `portal.properties` file.

Role-based display of portlets in Add Application pop-up

In `liferay-portlet.xml` file or `liferay-portlet-ext.xml` file, there are multiple `role-mapper` attributes as shown in the following code snippet:

```
    <role-mapper>
        <role-name>administrator</role-name>
        <role-link>Administrator</role-link>
    </role-mapper>
    <role-mapper>
        <role-name>guest</role-name>
        <role-link>Guest</role-link>
    </role-mapper>
    <role-mapper>
        <role-name>power-user</role-name>
        <role-link>Power User</role-link>
    </role-mapper>
    <role-mapper>
        <role-name>user</role-name>
        <role-link>User</role-link>
    </role-mapper>
```

Each of the `role-mapper` entries contains two names specified by `role-name` and `role-link`. The `role-name` value must be a role specified in the `role-name` inside `security-role-ref` element of a portlet in `portlet.xml`, `portlet-ext.xml`, or `portlet-custom.xml` files as highlighted in the `Blogs` portlet below. The `role-link` value must be the name of a Liferay role that exists in the database. The `role-mapper` element pairs up these two values to map roles from `portlet.xml`, `portlet-ext.xml`, or `portlet-custom.xml` to roles in the Liferay database. This mapping between these two values is needed because Liferay roles may contain

spaces whereas roles in `portlet.xml`, `portlet-ext.xml`, or `portlet-custom.xml` cannot contain spaces. This also adds extra flexibility where the portlet vendor does not need to have any knowledge about Liferay's roles.

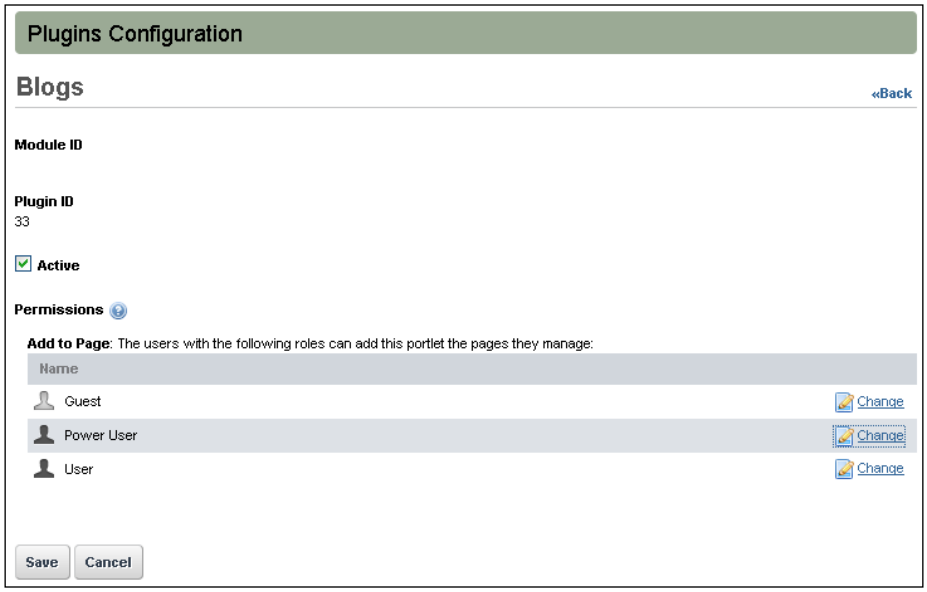
```
   <portlet>
      <portlet-name>33</portlet-name>
      <display-name>Blogs</display-name>
      <portlet-class>com.liferay.portlet.StrutsPortlet</portlet-class>
      <init-param>
         <name>view-action</name>
         <value>/blogs/view</value>
      </init-param>
      <expiration-cache>0</expiration-cache>
      <supports>
         <mime-type>text/html</mime-type>
      </supports>
      <resource-bundle>com.liferay.portlet.StrutsResourceBundle</
resource-bundle>
      <security-role-ref>
         <role-name>guest</role-name>
      </security-role-ref>
      <security-role-ref>
         <role-name>power-user</role-name>
      </security-role-ref>
      <security-role-ref>
         <role-name>user</role-name>
      </security-role-ref>
      <supported-public-render-parameter>categoryId</supported-public-
render-parameter>
      <supported-public-render-parameter>tag</supported-public-render-
parameter>
   </portlet>
```

A user must belong to one of the roles in the `security-role-ref` section in order to add this portlet plugin to a portal page through the **Add Application** pop-up page. In order to see **Add Application**, of course, the user must have **Manage Pages** permissions, or the page has been enabled explicitly or by default (implicitly) for **Update** by the user's role.

The default `security-role-ref` settings of each portlet can be overwritten by administrator in the **Control Panel** as explained below:

1. Log in as administrator.
2. Go to **Control Panel**.
3. Click on **Plugins Configuration** in the **Portal** section.
4. Go to **Portlet Plugins** (default tab).

5. Click the targeted portlet, such as Blog. You will see a list of roles as shown in the following screenshot under **Add to Page**: The users with the following roles can add this portlet to the pages they manage.



6. Click on the **Change** link for the targeted role if you would like to change the permission of a particular role.
7. Uncheck the checkbox for **Add to Page** actions. You can also limit the scope to a particular community while the default is at portal level.
8. Save your changes.

Adding custom roles to access portlets in Add Application pop-up

What if we need to add a custom role in the portal and then configure some portlets so that users with this custom role can add them to a page through Add Application pop-up page? This can be done at the code level in the ext plugin of Liferay 6 plugins SDK as below.

1. Create an ext plugin in the Liferay 6 plugins SDK.
2. Add the following highlighted **Custom Administrator** role mappings to `${liferay.plugins.sdk}/ext/ext-ext/docroot/WEB-INF/liferay-portlet-ext.xml`.

```
<role-mapper>
   <role-name>custom-administrator</role-name>
   <role-link>Custom Administrator</role-link>
</role-mapper>
```

3. Update (add, edit, or delete) the `security-role-ref` elements of each portlet's portlet initialization configuration in `${liferay.plugins.sdk }/ext/ext-ext/docroot/WEB-INF/portlet-ext.xml`.

   For example, add this custom role to this portlet configuration file:

```
<portlet>
   <portlet-name>ServiceDesk</portlet-name>
   <display-name>ServiceDesk</display-name>
   <portlet-class>com.liferay.portlet.StrutsPortlet</portlet-
class>
   <init-param>
      <name>view-action</name>
      <value>/ext/servicedesk/view_servicedesk</value>
   </init-param>
   <expiration-cache>0</expiration-cache>
   <supports>
      <mime-type>text/html</mime-type>
   </supports>
   <resource-bundle>com.liferay.portlet.StrutsResourceBundle</
resource-bundle>
   <security-role-ref>
      <role-name>administrator</role-name>
   </security-role-ref>
<security-role-ref>
   <role-name>custom-administrator</role-name>
</security-role-ref>
</portlet>
```

4. Add the **Custom Administrator** regular role to Liferay Portal through **Control Panel** | **Roles** | **Add page**.

Now once the ext plugin is built and deployed, the sample **ServiceDesk** portlet will be available for users with **Custom Administrator** role to add to a portal page through **Add Application** pop-up page.

Please note that the `security-role-ref` element in a portlet's XML file is ignored by Liferay Portal if the portlet is from hot-deployed portlet WARs. This is a bug in both Liferay 5.2 and 6.0 versions as documented in Liferay ticket system at `http://issues.liferay.com/browse/LPS-8955`.

Also, Liferay Portal 6.0 has improved the role-based access by providing better configuration setting in **Control Panel**. The default settings in any portlet's `security-role-ref` element can be overwritten by configuration change as below:

1. Go to **Control Panel** | **Roles**.
2. Pick the role you would like to give permission to (or the role you want to remove the permission from) and select **Define Permissions**.
3. In the **Add Permissions** dropdown, select the **Applications** category and look for the portlet you are targeting for.
4. Check (or uncheck) the action **Add to Page**.
5. Save your changes.

In other words, you do it just like you would for any other permission of the portal.

Portlet UI customization

Liferay Portal provides some built-in features for users to configure the UI of portlets.

Portlet UI customization through configuration in chrome

The portlet chrome includes portlet name, icon for **Look and Feel** and **Configuration**, **Minimize**, **Maximize**, and **Close** icons. Only users with the appropriate permissions can see some or all of these icons.

The portlet name can be changed directly by users with appropriate permission. Users can go to **Look and Feel** page to enable/disable portlet borders, change text styles, background styles, border styles, margin and padding, and even apply custom CSS class names for this portlet instance.

Customization of Search Container

Liferay **Search Container** is a utility to display tabular data with built-in pagination. Some of the default settings in the Search Container can be configured in `portal-ext.properties`.

The following default property values can be reset to the available values for the number of entries to display per page. An empty value, or commenting out the value, will disable delta resizing. The default of 20 will apply in all cases. Always include 20, as it is the default page size when no delta is specified. The absolute maximum allowed delta is 200.

```
search.container.page.delta.values=5,10,20,30,50,75
```

The following default property value can be reset to the maximum number of pages available above and below the currently displayed page.

```
search.container.page.iterator.max.pages=25
```

The following default property value can be reset to false to remove the pagination controls above or below the tabular data table, respectively.

```
search.container.show.pagination.top=true
search.container.show.pagination.bottom=true
```

OpenOffice integration for document format conversion

Enabling OpenOffice integration allows some portlets, such as the **Web Content Display** portlet, to provide document format conversion functionality such as generating Microsoft Word or PDF format documents on the fly.

To enable the format conversion, a Portal Administrator needs to perform the following steps:

1. Download Open Office from `http://www.openoffice.org/`.
2. Install Open Office on the same server to which Liferay Portal is installed.
3. Open a windows console and cd to `${OPENOFFICE_HOME}\program`.
4. Start Open Office in the command line as shown below:

   ```
   soffice -headless -accept="socket,host=127.0.0.1,port=8100;urp;"
   ```

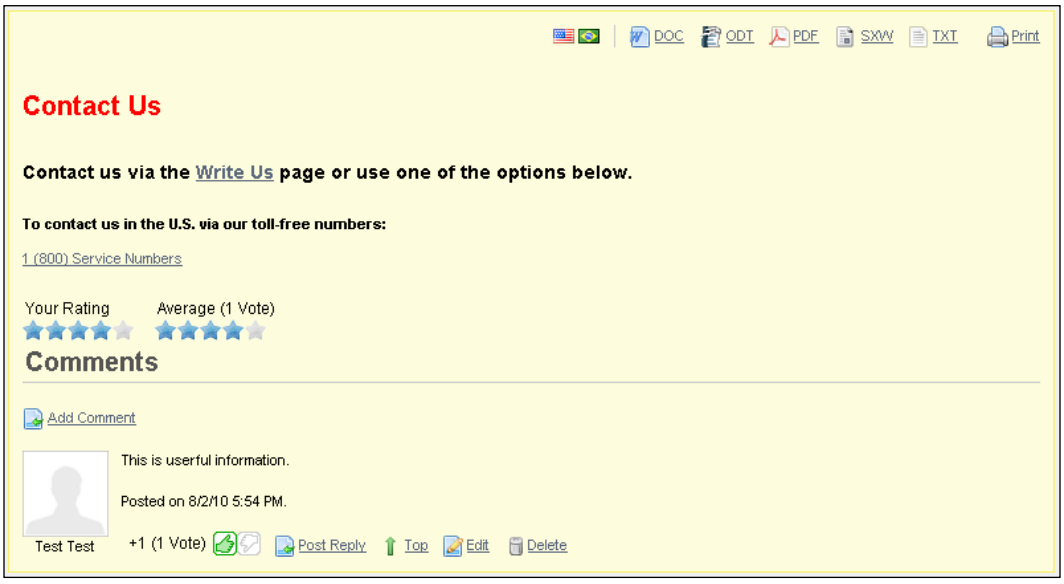
5. Add the following entries to `portal-ext.properties` and restart Liferay.

   ```
   openoffice.server.enabled=true
   openoffice.server.host=127.0.0.1
   openoffice.server.port=8100
   openoffice.cache.enabled=true
   ```

6. Or you can login Liferay as Portal Administrator, go to **Control Panel** | **Server** | **Sever Administration** | **OpenOffice**, check **Enabled**, enter the default Open Office port number 8100, and save the change.
7. Now go back to any **Web Content Display** portlet where you can select your article.
8. Click on **Configuration**.

9. Check all or some of the checkboxes in the **Enable Conversion To** section. You can also check **Enable Print**, **Enable Ratings**, **Enable Comments**, and **Enable Comment Ratings** as shown in the following screenshot, and save your changes.

10. As shown in the following screenshot, the format conversion icons such as Microsoft Word and PDF icons and Print icon are displayed at the top of the article. The ratings, comments and comment ratings features are displayed at the bottom of the article.



Changing the default WYSIWYG online editor

You can configure individual JSP pages to use a specific implementation of the available WYSIWYG editors: CKEditor, FCKeditor, liferay, simple, TinyMCE, or tinymcesimple.

The default editor is CKEditor and can be changed in `portal-ext.properties` as below:

```
editor.wysiwyg.default=fckeditor
```

Or the editor used in each related portlet can be individually configured in `portal-ext.properties` to overwrite the following default settings in `portal.properties`:

```
editor.wysiwyg.portal-web.docroot.html.portlet.blogs.edit_entry.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.calendar.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.enterprise_admin.view.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.invitation.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_article_
content.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_article_
content_xsd_el.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.login.configuration.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.mail.edit.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.mail.edit_message.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.message_boards.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.shopping.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.wiki.edit.html.
jsp=ckeditor
```

Configuration with portlet preferences

Another way to change the default behavior of a portlet is through `PortletPreferences`. This is widely used as a way to change the configuration of each portlet instance. Please keep in mind that when a new portlet instance is created, the configuration you set in a previous portlet instance is not applied to this newly created one and you have to go through the configuration again for this portlet instance.

The following sample `processAction` method in a sample `PatientDemographicsPortlet.java` shows how `PortletPreferences` can be used to save whether social security number should be displayed in the view page of this portlet instance.

```
public void processAction(ActionRequest req, ActionResponse res)
throws IOException, PortletException
{
        ...
        PortletPreferences prefs = req.getPreferences();
        String displaySSN = req.getParameter("displaySSN");
        if(!isEmpty(displaySSN))
        {
              prefs.setValue("displaySSN", displaySSN);
        }
        try
        {
            prefs.store();
            res.setPortletMode(PortletMode.VIEW);
        }
        catch(ValidatorException ve)
        {
            String webMsg = ve.getMessage();
            res.setRenderParameter("webMsg", webMsg);
             logger.severe("ValidatorException:" + webMsg);
            res.setPortletMode(PortletMode.EDIT);
        }
}
```

Changing the default settings of some Liferay out-of-box portlets

Liferay Portal provides configuration settings in `portal.properties` for some of the out-of-box portlets such as **Admin**, **Announcements**, **Assert**, **Asset Publisher**, **Blogs**, **Breadcrumb**, **Calendar**, **Communities**, **Document Library**, **Dockbar**, **Flags**, **iFrame**, **Image Gallery**, **Invitation**, **Journal**, **Journal Articles**, **Journal Content Search**, **Login**, **Message Boards**, **My Places**, **Navigation**, **Nested Portlets**, **Portlet CSS**, **Search**, **Shopping**, **Software Catalog**, **Tags Compiler**, **Tasks**, **Translator**, **Wiki**, and so on.

Please refer to `portal.properties` for a more detailed explanation. These settings can be overwritten in `portal-ext.properties`.

Customization of Control Panel

Liferay **Control Panel** is a centralized GUI-based utility where users with different permissions have different administrative tools available within the portal.

Changing the default theme for Control Panel

The general look and feel of **Control Panel** is controlled by the theme used on the page. The default `Control Panel Theme` can be changed to other theme in the dropdown of **Default Control Panel Theme** on **Control Panel** | **Portal** | **Settings** | **Display Settings** page.

The following default settings including the default theme for **Control Panel** can be overwritten in `portal-ext.properties` as well:

```
#
# Set the name of the layout.
#
control.panel.layout.name=Control Panel

#
# Set the friendly URL of the layout.
#
control.panel.layout.friendly.url=/manage

#
# Set the theme of the layout.
#
control.panel.layout.regular.theme.id=controlpanel

#
# Set the maximum number of communities that will be shown in
# the navigation menus. A large value might cause performance
# problems if the number of communities that the user can
# administrate is very large.
#
control.panel.navigation.max.communities=50

#
# Set the maximum number of organizations that will be shown
# in the navigation menus. A large value might cause
# performance problems if the number of organizations that the
# user can administrate is very large.
#
control.panel.navigation.max.organizations=50

#
# Set the name of a class that implements
```

```
# com.liferay.portlet.ControlPanelEntry. This class denotes
# the default value of of the element "control-panel-entry-
# class" in liferay-portlet.xml and is called by the Control
# Panel to decide whether the portlet should be shown to a
# specific user in a specific context.
#
control.panel.default.entry.class=com.liferay.portlet.
DefaultControlPanelEntry
```

Changing the portlet display category and order in Control Panel

The administrative tools available in the left panel of **Control Panel** are implemented as portlets. These administrative portlets are grouped into 4 categories: **My Account**, **Content management** for any selected organization and community including one for global contents across organizations and communities, **Portal administration**, and **Server**. Correspondingly, these four categories are represented by four values: my, content, portal, and server, respectively.

Each portlet can be individually removed from the **Control Panel**. The display category and the order within a particular category can also be changed in `${PORTAL_ROOT_HOME}\WEB-INF\liferay-portlet.xml` file.

For example, the following highlighted lines specify that the **Update Manager** portlet is displayed in the **Server** category and its display order weight is 4.0 within the **Server** category. This means that any portlets with weight less than 4.0 within this **Server** category will be displayed before this portlet and any portlets with a weight great than 4.0 within this **Server** category will be displayed after this portlet.

```
<portlet>
   <portlet-name>104</portlet-name>
   <icon>/html/icons/update_manager.png</icon>
   <struts-path>update_manager</struts-path>
   <control-panel-entry-category>server</control-panel-entry-category>
   <control-panel-entry-weight>4.0</control-panel-entry-weight>
   <control-panel-entry-class> com.liferay.portlet.admin.
OmniadminControlPanelEntry
   </control-panel-entry-class>
   <use-default-template>false</use-default-template>
   <private-request-attributes>false</private-request-attributes>
   <private-session-attributes>false</private-session-attributes>
   <render-weight>50</render-weight>
   <header-portlet-css>   /html/portlet/update_manager/css/main.jsp
   </header-portlet-css>
   <css-class-wrapper>portlet-update-manager</css-class-wrapper>
   <add-default-resource>true</add-default-resource>
</portlet>
```

Adding custom portlets to Control Panel

You can also create your own custom portlets, and add them to appropriate category in a specified position in **Control Panel**.

For example, you can use Liferay Plugins SDK to create a **Palm-Tree Control Panel** portlet. The following highlighted lines are the key configurations to make sure it will be displayed in the **Portal** category in the ninth position (as eighth position has been taken by the out-of-box Liferay administrative **Custom Fields** portlet).

```
<portlet>
   <portlet-name>palmtree-controlpanel-test</portlet-name>
   <icon>/icon.png</icon>
   <control-panel-entry-category>portal</control-panel-entry-category>
   <control-panel-entry-weight>8.0</control-panel-entry-weight>
   <instanceable>false</instanceable>
   <header-portlet-css>/css/main.css</header-portlet-css>
   <footer-portlet-javascript>/js/main.js</footer-portlet-javascript>
   <css-class-wrapper>palmtree-controlpanel-test-portlet</css-class-
wrapper>
</portlet>
```

The following screenshot shows how it looks like after the custom portlet is deployed.

Summary

In this chapter, you have reviewed some Liferay terminologies, how to set up an organization, UI and usability features in Liferay Portal 6, internationalization (i18n) and localization (L10n) at different levels, UI customization of portal page, portlets, Add Application pop-up panel, Control Panel, and so on.

In the next chapter, we are going to look at some advanced theming topcs.

5
Advanced Theme

A typical portal page consists of a theme, a layout template, and one or more portlets. In *Chapter 2*, *Basic Theme Development*, we covered the basic concepts in themes and how to create a simple theme. In *Chapter 3*, *Layout Templates*, we covered the concepts in layout templates and how to create your own layouts. In *Chapter 4*, *Styling Pages*, we discussed the page styling and some **User Interface** (**UI**) customization at different levels.

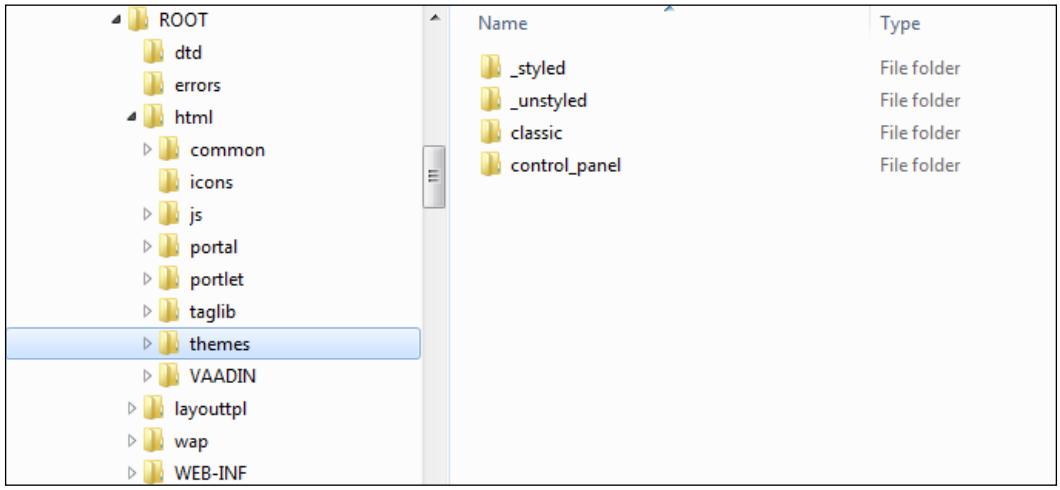
In this chapter, we will explore some aspects of a theme in depth and elaborate on the following theme topics:

- Changing the value of the `theme.parent` property for theme creation
- Adding color schemes
- Configurable settings in a theme
- Pre-defined theme settings
- Embedding portlets in a theme
- Theme upgrade
- Creating a FreeMarker-template theme
- Brower compatibility
- Liferay IDE and other development tools

We will have some lab activities of adding color schemes to a theme and upgrading a theme to Liferay Portal 6.

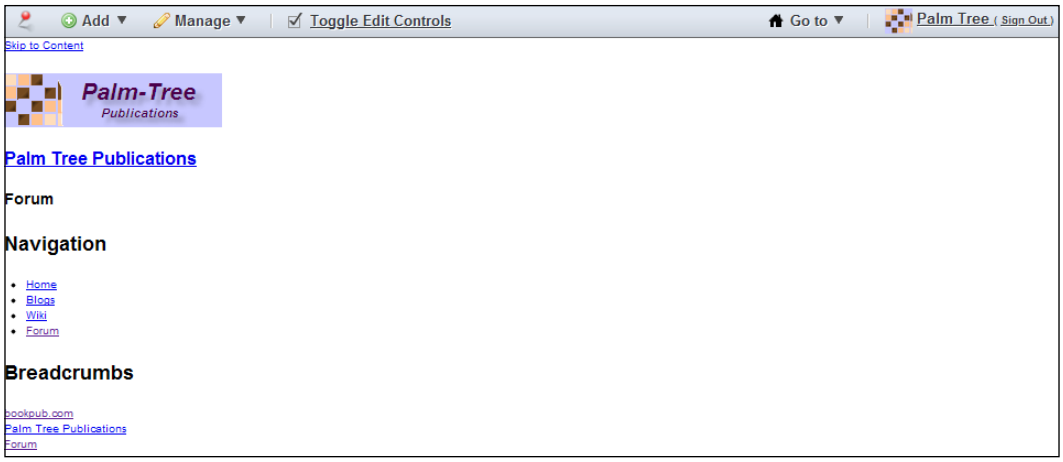
Changing theme.parent property in theme

Liferay provides four different theme implementations out-of-box in the `${PORTAL_ROOT_HOME}/html/themes/` folder as shown in the following screenshot:



When you create a new theme in the `themes/` directory of the Plugins SDK, the Ant script will copy some files to the new theme from one of these three folders, `_styled/`, `_unstyled/`, and `classic/`, which can be specified in the `${PLUGINS_SDK_HOME}/themes/build-common-theme.xml` file.

For example, you can go to the `${PLUGINS_SDK_HOME}/themes/` directory and run `create.bat palmtree "Palm-Tree Publications theme"` on Windows or `./create.sh palmtree "Palm-Tree Publications theme"` on Linux, respectively. Or you can use Liferay IDE to create same `New Liferay Theme Plugin Project`. This will create a theme folder named `palmtree-theme` in the Liferay Plugins SDK environment. When you run `ant` to build and deploy the theme and then apply the newly created theme to your page, you will find out that the look and feel of the page is messed up, as shown in the following screenshot:



If you are familiar with theme development in Liferay Portal 5.2, you may wonder what has happened to the theme created in Liferay Portal 6 Plugins SDK because you would expect a fully working theme with two simple commands, `create` and `ant`. This is because the following `build.xml` file in your theme specifies `_styled` as the value for the `theme.parent` property:

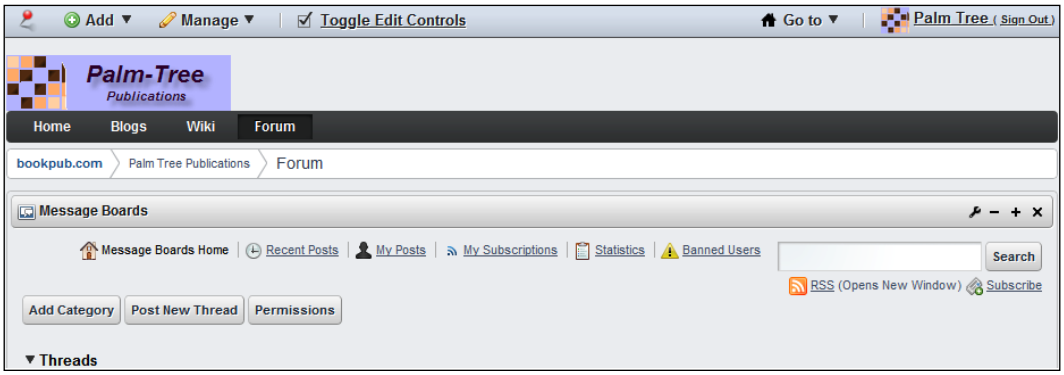
```
<?xml version="1.0"?>
<project name="palmtree-theme" basedir="." default="deploy">
  <import file="../build-common-theme.xml" />
  <property name="theme.parent" value="_styled" />
</project>
```

This means that when your newly created theme is built, it will copy all the files from the `_styled/` folder in the `${PORTAL_ROOT_HOME}/html/themes/` directory to the `docroot/` folder of your theme. The default `_styled/` folder does not have enough files to create a completely working theme and that is why you see a messed-up page when the theme is applied to a page. The reason why this default `_styled/` folder does not include enough files is that some Liferay users prefer to have minimal set of files to start with.

You can modify the `build.xml` file for your theme in the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/` folder by changing value of the `theme.parent` property from `_styled` to `classic`, if you prefer to use the Classic theme as the basis for your theme modification.

```
<property name="theme.parent" value="classic" />
```

Now you will see that your page looks exactly the same as that with the Classic theme after you build and apply your theme to the page (refer to the following screenshot):



Adding color schemes to a theme

When you create a theme in the Plugins SDK environment, the newly created theme by default supports one implementation and does not automatically have color schemes as variations of the theme. This fits well if you would like to have a consistent look and feel, especially in terms of the color display, across all the pages that the theme is applied to.

In your portal application, you might have different sites with slightly different look and feel for different groups of users such as physicians and patients. You might also need to display different pages such as public pages with one set of colors and the private pages with a different set of colors. However, you don't want to create several different themes for reasons such as easy maintenance. In this case, you might consider creating different color schemes in your theme.

Color schemes are specified using a **Cascading Style Sheets** (**CSS**) class name, with which you are able to not only change the colors, but also choose different background images, border colors, and so on.

In the previous section, we created a PalmTree Publication theme, which takes the Classic theme as its parent theme. Now we can follow the mentioned steps to add color schemes to this theme:

1. Copy the `${PORTAL_ROOT_HOME}/webapps/palmtree-theme/WEB-INF/liferay-look-and-feel.xml` file to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/WEB-INF/` folder.
2. Open the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/WEB-INF/liferay-look-and-feel.xml` file in your text editor.

3. Change `<theme id="palmtree" name="PalmTree Publication Theme" />` as shown in the highlighted lines here, and save the change:

```
<look-and-feel>
  <compatibility>
    <version>6.0.5+</version>
  </compatibility>
  <theme id="palmtree" name="Palm Tree Publications Theme">
    <color-scheme id="01" name="Blue">
      <css-class>blue</css-class>
      <color-scheme-images-path>${images-path}/color_schemes/
blue</color-scheme-images-path>
    </color-scheme>
    <color-scheme id="02" name="Green">
      <css-class>green</css-class>
    </color-scheme>
    <color-scheme id="03" name="Orange">
      <css-class>orange</css-class>
    </color-scheme>
  </theme>
</look-and-feel>
```

4. Go to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/palmtree-theme/_diffs/` folder and create a `css/` subfolder.
5. Copy both `custom.css` and `custom_common.css` from the `${PORTAL_ROOT_HOME}/html/themes/classic/_diffs/css/` folder to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/css/` folder. This is to let the default styling handle the first color scheme `blue`.
6. Create a `color_schemes/` folder under the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/palmtree-theme/_diffs/css/` folder.
7. Place one `.css` file for each of your additional color schemes. In this case, we are going to create two additional color schemes: `green` and `orange`.
8. To make the explanation simpler, copy both the `green.css` and `orange.css` files from the `${PORTAL_ROOT_HOME}/html/themes/classic/_diffs/css/color_schemes/` folder to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/css/color_schemes/` folder.
9. Copy all images from the `${PORTAL_ROOT_HOME}/html/themes/classic/_diffs/images/` folder to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/images/` folder.

10. Add the following lines in your `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/css/custom.css` file:

```
@import url(color_schemes/green.css);
@import url(color_schemes/orange.css);
```

    If you open either the `green.css` or the `orange.css` file, you will be able to identify the styling for the CSS by using a color prefix for each CSS definition. For example, in the `orange.css` file you would find that each item is defined like this:

```
orange .dockbar {
  background-color: #AFA798;
  background-image: url(../../images/color_schemes/orange/dockbar/
dockbar_bg.png);
}
.orange .dockbar .menu-button-active {
  background-color: #DBAC5C;
  background-image: url(../../images/color_schemes/orange/dockbar/
button_active_bg.png);
}
```

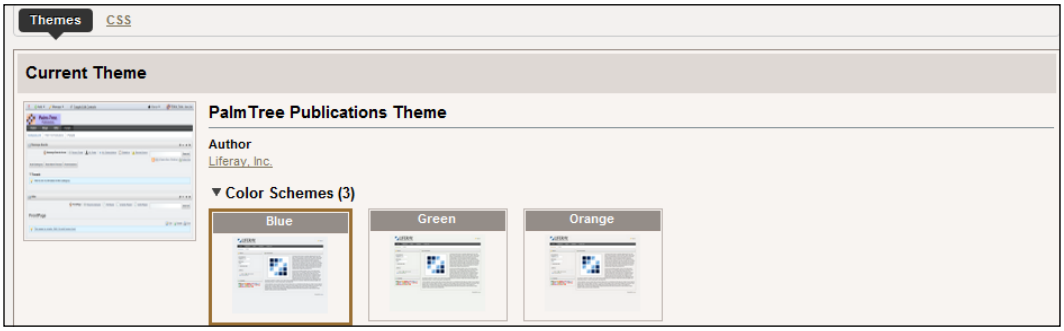
    In the `green.css` file, the style is defined like this:

```
green .dockbar {
  background-color: #A2AF98;
  background-image: url(../../images/color_schemes/green/dockbar/
dockbar_bg.png);
}
.green .dockbar .menu-button-active {
  background-color: #95DB5C;
  background-image: url(../../images/color_schemes/green/dockbar/
button_active_bg.png);
}
```

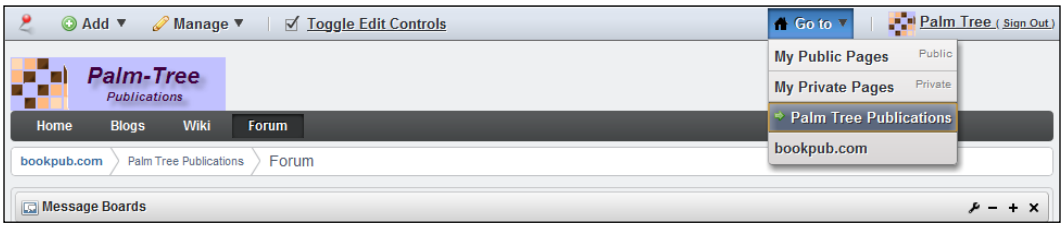
    Also, notice that the related images used for the different color schemes are included in the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/images/color_schemes/` folder.

11. Re-build and deploy the PalmTree Publication theme.
12. Log in as administrator and go to the **Control Panel** to apply this theme to the PalmTree Publications Inc. organization. You will be able to see three color schemes available under this theme.
13. Select any of them to apply it to the **Public Pages**.

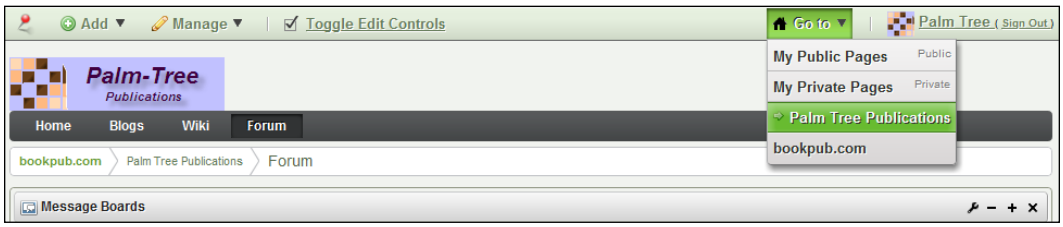
14. Take a screenshot of the page when each of the color schemes is applied and save it as `thumbnail.png` in the corresponding `blue`, `green`, and `orange` subfolders in the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/images/color_scheme/` folder. Three screenshots are used to distinguish between the three color schemes in the **Control Panel** as seen in the following screenshot:



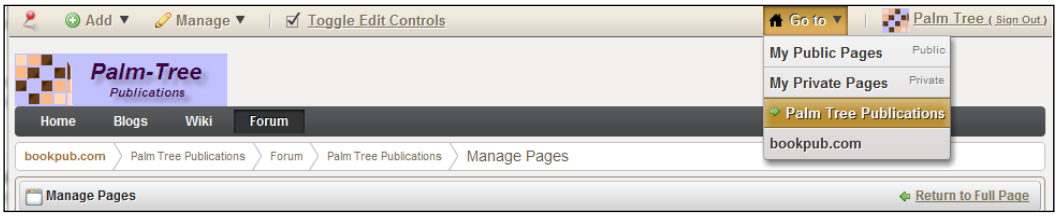
The following screenshots shows how each of the three color schemes looks when applied to a portal page:



As shown in above screenshot, color scheme blue has been applied on the Home page, by default. The following screenshot shows applying color scheme green on the current page. Of course, you would be able to apply color schemes blue or green in the entire site, if required.



Similar to color schemes blue and green, you can apply color scheme orange as well on the current page or the entire site, as shown in following screenshot:



So it works! The page background is with a hue of gray color. Now, what if we want to change the page background color to red for the green color schema?

Update the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/css/color_schemes/green.css` file as follows. The commented outline is the original content. The next line after the comment is the new content. The `#FF0000` code is for the red color.

```
body.green, .green .portlet {
  /*background-color: #F1F3EF;*/
  background-color: #FF0000;
}
```

Re-deploy the PalmTree theme and refresh the portal page that uses the `green` color scheme. Now, you should be able to see the portal page with a red background color.

As you can see, you can use theme color schemes to create some variants of the same theme without creating multiple themes. This is useful when you have different but related user roles such as physicians, nurses, and patients and you need to build a different site for each of them. You can use the color schemes to display each of these sites in a slightly different look and feel.

Configurable theme settings

There are many use cases where you would like to change some default settings in the theme so that you can modify the values after the theme is built and deployed. Fortunately, each theme can define a set of settings to make this configurable. The settings are defined as key-value pairs in the `liferay-look-and-feel.xml` file of the theme with the following syntax:

```
<settings>
  <setting key="my-setting1" value="my-value1" />
  <setting key="my-setting2" value="my-value2" />
</settings>
```

These settings can then be accessed in the theme templates using the following code:

```
$theme.getSetting("my-setting1")
$theme.getSetting("my-setting2")
```

For example, I need to create two themes—PalmTree Publications theme and AppleTree Publications theme. They are exactly the same except for some differences in the footer content that includes copyright, terms of use, privacy policy, and so on. Instead of creating two themes packaged as separate `.war` files, we create one set of two themes that share the majority of the code including CSS, JavaScript, images, and most templates; but with one configurable setting and two different implementations of the footer Velocity files.

Here is how this can be done:

1. Open `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/WEB-INF/liferay-look-and-feel.xml` in the above sample PalmTree theme.
2. Copy the PalmTree theme section and paste it in the same file but after this section.
3. Rename the values of `id` and `name` from `palmtree` and `PalmTree Publications theme` to `appletree` and `AppleTree Publications theme` in the second section.
4. Add the following setting to the `palmtree` section before the color-scheme definition:

```
<settings>
  <setting key="theme-id" value="palmtree" />
</settings>
```

5. Add the following setting to the `appletree` section before the color-scheme definition:

```
<settings>
  <setting key="theme-id" value="appletree" />
</settings>
```

6. Find the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/WEB-INF/liferay-look-and-feel.xml` file as follows:

```
<look-and-feel>
  // ignore details
  <theme id="palmtree" name="PalmTree Publications Theme">
    <settings>
      <setting key="theme-id" value="palmtree" />
    </settings>
    <color-scheme id="01" name="Blue">
    // ignore details
    </color-scheme>
```

```
  </theme>
  <theme id="appletree" name="AppleTree Publications Theme">
    <settings>
      <setting key="theme-id" value="appletree" />
    </settings>
    <color-scheme id="01" name="Blue">
    // ignore details
    </color-scheme>
  </theme>
</look-and-feel>
```

7. Copy the `portal_normal.vm` file of the Classic theme from the `${PORTAL_ROOT_HOME}/html/themes/classic/_diffs/templates/` folder to the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/templates/` folder.
8. Open the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/templates/portal_normal.vm file`
9. Replace the default footer section with the following code:

```
#set ($theme_id = $theme.getSetting("theme-id"))
#if ($theme_id == "palmtree")
  #parse ("$full_templates_path/footer_palmtree.vm")
#else
  #parse ("$full_templates_path/footer_appletree.vm")
#end
```

10. Create your own version of the two footer Velocity templates in the `${PLUGINS_SDK_HOME}/themes/palmtree-theme/docroot/_diffs/templates/` folder.
11. Add related CSS definitions for your footer in your `custom.css` file.
12. Build and deploy the theme `.war` file.

Now you should be able to see both the `PalmTree` and `AppleTree` themes when you go to the Control Panel to apply either theme to your page.

Based on the theme to be used, you should also notice that your footer is different.

Of course, we can take other approaches to implement a different footer in the theme. For example, you can dynamically get the organization or community name and render the footer differently. However, the approach we explained previously can be expanded to control the UI of the other theme components such as the header, navigation, and portlets.

Portal predefined settings in theme

In the previous section, we discussed that theme engineers can add configurable custom settings in the `liferay-look-and-feel.xml` file of a theme. Liferay portal can also include some predefined out-of-the-box settings such as `portlet-setup-show-borders-default` and `bullet-style-options` in a theme to control certain default behavior of the theme.

Let us use `portlet-setup-show-borders-default` as an example to explain how Liferay portal controls the display of the portlet border at different levels.

If this predefined setting is set to `false` in your theme, Liferay portal will turn off the borders for all portlets on all pages where this theme is applied to.

```
<settings>
  <setting key="portlet-setup-show-borders-default" value="false" />
</settings>
```

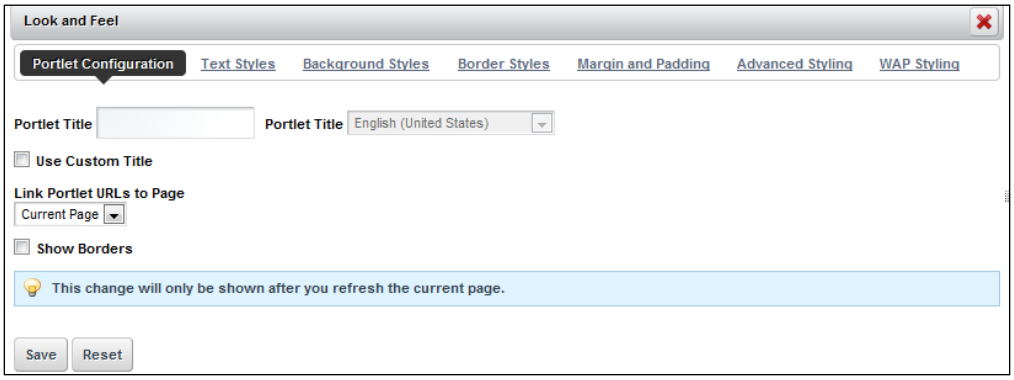
By default, the value is set to `true`, which means that all portlets will display the portlet border by default.

If the predefined `portlet-setup-show-borders-default` setting is set to `true`, it can be overwritten for individual portlets using the `liferay-portlet.xml` file of a portlet as follows:

```
<liferay-portlet-app>
  // ignore details
  <portlet>
    <portlet-name>sample</portlet-name>
    <icon>/icon.png</icon>
    <use-default-template>false</use-default-template>
    <instanceable>true</instanceable>
    <header-portlet-css>/css/main.css</header-portlet-css>
    <footer-portlet-javascript>/js/main.js</footer-portlet-javascript>
    <css-class-wrapper>sample-portlet</css-class-wrapper>
  </portlet>
// ignore details
</liferay-portlet-app>
```

Set the `use-default-template` value to `true` if the portlet uses the default template to decorate and wrap content. Setting it to `false` will allow the developer to maintain the entire output content of the portlet. The default value is `true`. The most common use of this is when you want the portlet to look different from the other portlets or if you want the portlet not to have borders around the output content.

The `use-default-template` setting of each portlet, after being set to either `true` or `false`, in the `liferay-portlet.xml` file, can be further overwritten by the portlet's popup CSS setting. Users with the appropriate permissions can change it by going to the **Look and Feel** | **Portlet Configuration** | **Show Borders** checkbox of the portlet, as shown in the next screenshot:



Embedding non-instanceable portlets in theme

One common requirement in theme development is to add some portlets in different components of a theme.

For example, you might want to add the Sign In portlet in the header of your theme, the Web Content Search portlet in the navigation area, and the Site Map portlet in the footer area. All the Liferay out-of-the-box portlets can be referred in the `${PORTAL_ROOT_HOME}/WEB-INF/liferay-portlet.xml` file.

How can this be achieved?

Well, it can be quite easy or pretty tricky to embed an out-of-the-box portlet in a theme.

Embedding Dockbar and Breadcrumb portlets in a theme

As explained in *Chapter 4, Styling Pages*, the Dockbar portlet is embedded at the very top in the default Classic theme in the `portal_normal.vm` file as shown next:

```
#if($is_signed_in)
  #dockbar()
#end
```

In the same way, the **Breadcrumb** portlet can be embedded in the content area of the Classic theme in the `portal_normal.vm` file:

```
#breadcrumbs()
```

Embedding Language and Web Content Search portlets in a theme

Some other Liferay out-of-the-box portlets such as the Language and Web Content Search portlets can be embedded in a theme or a layout template easily.

For example, the **Web Content Search** portlet can be added to the far right side of the horizontal navigation area of your theme as follows in the `navigation.vm` file of your theme.

```
<div id="navbar">
  <div id="navigation" class="sort-pages modify-pages">
    <div id="custom">
      $theme.journalContentSearch()
    </div>
    // ignore details
  </div>
</div>
```

In the same way, the Language portlet can be embedded in the `portal_normal.vm` Velocity template file of your theme:

```
$theme.language()
```

Again, you need to add the necessary CSS definitions in your `custom.css` file to control the look and feel and the location of your embedded portlet(s).

Embedding Sign In portlet in the header area of a theme

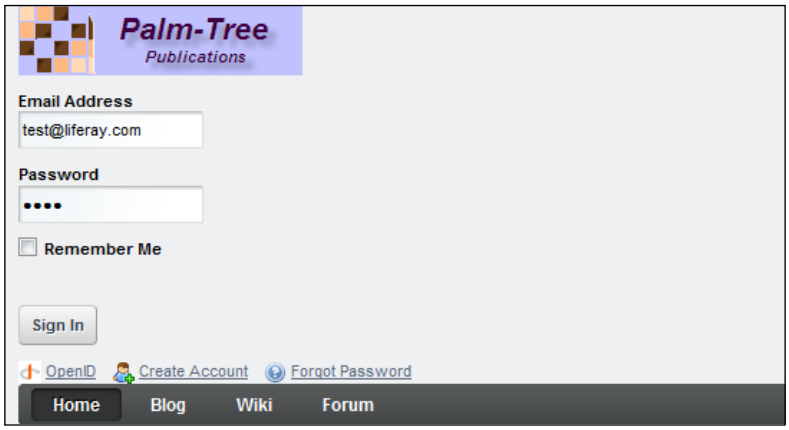
Sometimes the theme design requires that the Liferay Sign In portlet be in the header area. By default, the Sign In portlet has a portlet border but we need to disable it. The previously mentioned approaches for embedding a portlet in a theme through Velocity attributes in a template do not work in this case because we need to customize the default UI of the embedded portlet.

Instead, we can add the following code to the header section in the `portal_normal.vm` file in our sample `PalmTree` theme:

```
#if(!$is_signed_in)
  #set ($locPortletId = "58")
```

```
    $velocityPortletPreferences.setValue("portlet-setup-show-borders",
"false")
    #set($locRenderedPortletContent = $theme.runtime($locPortletId, "",
$velocityPortletPreferences.toString()))
    $locRenderedPortletContent
    $velocityPortletPreferences.reset()
#end
```

After the theme is re-built and re-deployed, we can see that the Sign In portlet is rendered in the header area underneath the logo without the portlet border.



The next step for us is to modify the `custom.css` file and the related files by adding CSS definition to control the location and look and feel of this Sign In portlet. The following screenshot shows the Sign In portlet in the header area and the Web Content Search portlet in the navigation area in a working theme in the production environment:

Embedding instanceable portlets in theme

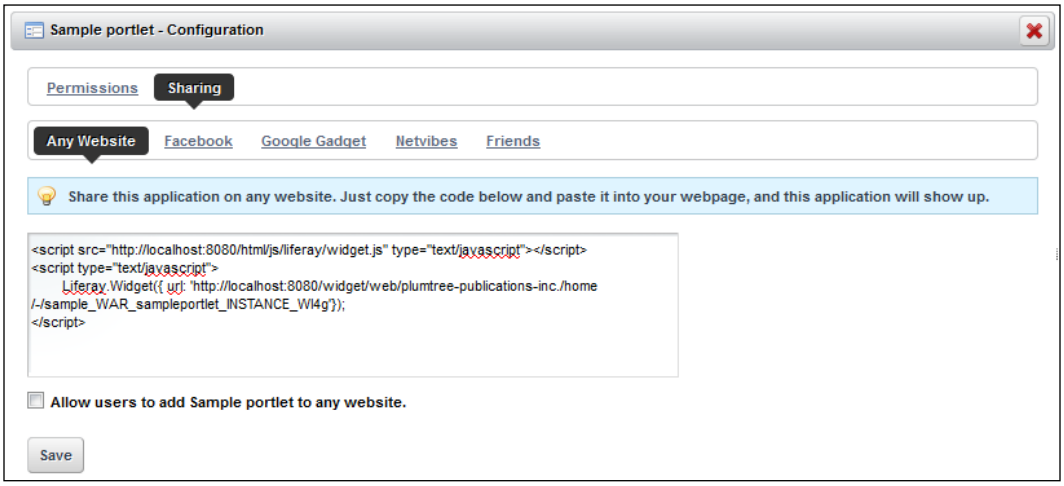
All these embedded portlets are non-instanceable as defined in the `liferay-portlet.xml` file. A **non-instanceable** portlet has only one instance on a portal page and therefore, its portlet ID is static. For **instanceable** portlets such as the Web Content Display portlet, the portlet ID is generated when an instance of the portlet is created, and therefore, can be unknown when the theme is created. This makes it more difficult to embed such portlets in a theme.

Custom portlets can also be embedded in a theme.

The first thing you need to know is the porlet ID. This can be found out by following these steps:

1. Create a custom portlet to be embedded.
2. Build and deploy the portlet.
3. Log in as portal administrator.
4. Add the portlet on a page.
5. Click on **Configuration** | **Sharing** | **Any Website**.

The portlet ID is shown in the JavaScript URL, as displayed in the following screenshot. In this case, the portlet ID is `sample_WAR_sampleportlet_INSTANCE_WI4g`.



Now you can embed this portlet in a theme by adding the following code in your theme Velocity template file:

```
$theme.runtime("sample_WAR_sampleportlet_INSTANCE_WI4g")
```

Please note that the above `$theme.runtime(portlet.id)` call creates a new portlet on the current page. As a result, it actually creates a new record in the Liferay database table. Each portlet on each page has its own portlet preference, and therefore, you would have to reset its preference when a new page with an embedded portlet in a theme is created. For more details about embedding portlets with portlet preferences, please refer to the forum post at `http://www.liferay.com/community/forums/-/message_boards/message/772138`.

Adding runtime portlets to a layout

Similar to adding a runtime portlet to a theme, you can add a runtime portlet to a layout in your custom layout template. For example, you can use the following code to add the Web Content Search portlet, which has a portlet ID of 77, to the third column in the second row of the `1_3_columns.tpl` of your custom layout template:

```
<div class="columns-3" id="content-wrapper">
  <table class="lfr-grid" id="layout-grid">
  <tr>
    <td class="lfr-column" colspan="3" id="column-1"
valign="top">
      $processor.processColumn("column-1")
    </td>
  </tr>
  <tr id="column-center">
    <td class="lfr-column thirty" id="column-2"
valign="top">
      $processor.processColumn("column-2")
    </td>
    <td class="lfr-column thirty" id="column-3"
valign="top">
      $processor.processColumn("column-3")
    </td>
    <td class="lfr-column thirty" id="column-4"
valign="top">
            $processor.processPortlet("77")
      $processor.processColumn("column-4")
    </td>
  </tr>
  </table>
</div>
```

The Web Content Search portlet will always be displayed on any page where the above custom layout template is used. The portlet can be configured, minimized or maximized but can't be removed from the page.

Theme upgrade

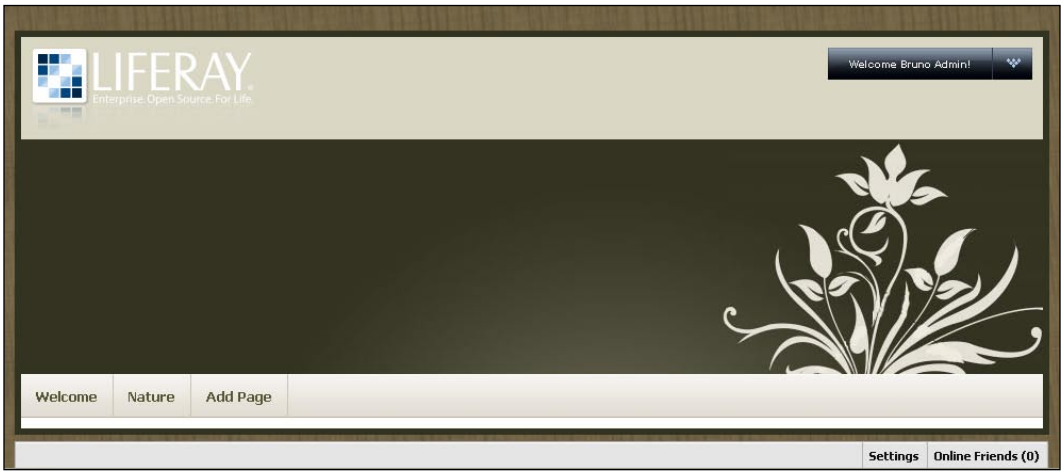
A common Liferay Portal project is to upgrade a portal application from an older version of Liferay Portal to Liferay Portal 6. The upgrade process typically includes the following steps:

- Installation of Liferay Portal 6
- Database upgrade
- Theme upgrade
- Content repository upgrade
- Portlet upgrade
- Upgrading the custom code, such as that in the Ext environment, in the previous version to the Ext plugin in Liferay Portal 6

In this section, we will focus on the theme upgrade process. The upgrading of the other components will be discussed in the later chapters.

Here, we will use the Natural Essence theme as an example and walk through the upgrading process of it, from Liferay 5.2 to 6. The source code of this theme is downloadable on the Community Plugins page on the Liferay site.

Let us first build the theme in the Plugins SDK of Liferay 5.2 and generate the `natural-essence-theme-5.2.0.1.war` file and then deploy it to `liferay-portal-tomcat-6.0-5.2.0`. Here is how it looks:



Now we are going to take the following steps to upgrade it to Liferay Portal 6, but we will keep the original look and feel:

1. Download `natural-essence-theme-5.2.0.1.zip` from `http://www.liferay.com/downloads/liferay-portal/community-plugins/`.
2. In the `${PLUGINS_SDK_HOME}/themes/` directory, run the following command to create a theme named *Natural Essence* in the Plugins SDK environment:

   ```
   create.bat natural-essence "Natural Essence theme"
   ```

3. Copy the `css/`, `images/`, `js/`, and `templates/` folders of the Classic theme from the `${PORTAL_ROOT_HOME}/html/themes/classic/` folder to the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/` folder.
4. Build and deploy it to Liferay Portal 6. You will get a Natural Essence theme with the same look and feel as the Liferay Classic theme. We will start the upgrade process from here.
5. Notice that the Natural Essence theme 5.2.0.1 is unique in body, wrapper, banner, and navigation backgrounds. So we will start the code update in these four parts first. Copy the `natural-essence-theme-5.2.0.1/images/custom/` folder, which contains three image files, to the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/images/` directory. This folder contains custom images for the Natural Essence theme.
6. Compare the `natural-essence-theme-5.2.0.1/css/custom.css` file with the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/css/custom.css` file. Copy the related content in the former `custom.css` file to the latter `custom.css` file. Update the latter `custom.css` file as follows. The commented out code is the original code:

   ```
   body {
     /*background: #EEF0F2;
     font-size: 11px;*/
     background: #7C6F5C url(../images/custom/body_bg.jpg);
     color: #222;
     padding: 33px 0;
   }
   #wrapper {
     /*background: none;
     margin: 0 auto;
     max-width: 90%;
     min-width: 960px;
     position: relative;*/
     background: #FFF;
   ```

```
  border: 6px solid #332;
  border-top: 6px solid #332;
  margin: 0 auto;
  width: 960px;
}
#banner {
  /*background: none;
  height: auto;*/
  background: #DAD7C5 url(../images/custom/banner_bg.jpg) no-
repeat scroll left bottom;
  padding: 0 0 220px;
  position: relative;
}
#navigation {
  /*background: #414445 url(../images/navigation/bg.png) repeat-x
0 0;
  clear: both;
  margin: 0 auto 5px;
  min-height: 2.2em;
  padding: 0 5px;*/
  background: #EAE7DF url(../images/custom/navigation_bg.gif);
  height: 41px;
}
```

7. Deploy the updated Natural Essence theme and compare it with the Natural Essence 5.2.0.1 theme in look and feel.
8. Notice that the Natural Essence 5.2.0.1 theme does not have the breadcrumb of **liferay.com** | **Nature**. Instead of the breadcrumb, there is a navigation bar. So we remove the breadcrumb and put the navigation bar in its place. In the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/templates/portal_normal.vm` file, remove the following section:

```
#if ($has_navigation)
  #parse ("$full_templates_path/navigation.vm")
#end
```

9. Remove the following section:

```
<nav class="site-breadcrumbs" id="breadcrumbs">
  <h1>
    <span>#language("breadcrumbs")</span>
  </h1>
  #breadcrumbs()
</nav>
```

10. Instead of the previous snippet of code, add the following code:

```
#if ($has_navigation)
  #parse ("$full_templates_path/navigation.vm")
#end
```

11. Build and deploy the theme to see the result.
12. There is a white strip above the **LIFERAY** logo, which does not look good. The logo presentation is controlled by the following code in the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/templates/portal_normal.vm` file:

```
<header id="banner" role="banner">
  <hgroup id="heading">
    <h1 class="company-title">
      <a class="logo" href="$company_url" title="#language("go-
to") $company_name">
        <span>$company_name</span>
      </a>
    </h1>
    // ignore details
```

13. In the `custom.css` file, find the corresponding style code as follows:

```
#banner .company-title {
  float: none;
  margin: 15px 0 0;
  position: static;
}
```

14. Update the previous snippet of code as follows:

```
#banner .company-title {
  float: none;
  margin: 0 0 0;
  position: static;
}
```

15. Notice that in the present navigation bar, the page names are in white, which are not vivid. The page name font color is controlled by the following code in the `${PLUGINS_SDK_HOME}/themes/natural-essence-theme/docroot/_diffs/templates/navigation.vm` file:

```
<nav class="sort-pages modify-pages" id="navigation">
  <h1>
    <span>#language("navigation")</span>
  </h1>
    <ul>
```

```
#foreach ($nav_item in $nav_items)
  #if ($nav_item.isSelected())
    <li class="selected">
      // ignore details
```

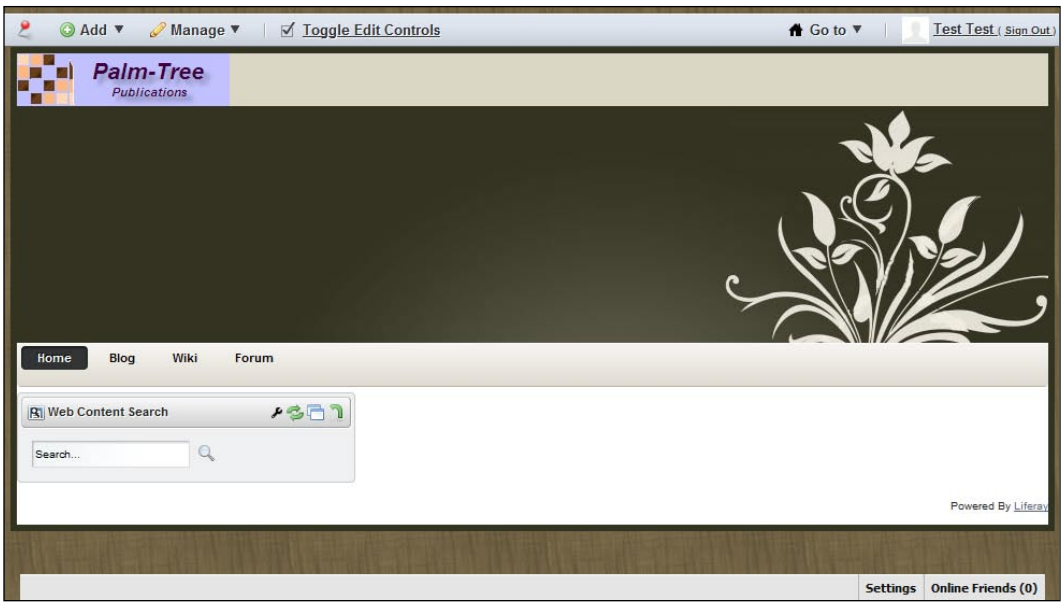
16. The corresponding style code in the `custom.css` file is as follows:

```
#navigation a {
  color: #FFF;
  font-size: 1.1em;
  font-weight: bold;
  margin: 0 1px;
  padding: 3px 15px;
  text-decoration: none;
}
```

17. Update the previous snippet of code as follows:

```
#navigation a {
  color: #000000;
  font-size: 1.1em;
  // ignore details
}
```

18. We have changed the font color into black. Here is how the Natural Essence theme looks now:



This is the Natural Essence theme 6. It looks almost exactly same as the Natural Essence theme 5.2.0.1.

The upgrade of a theme from an old version to Liferay Portal 6 is straightforward. The main difference is the introduction of Dockbar portlet, which includes some of the main administration functionalities in a very compact and short tool bar. This makes most themes in Liferay Portal 6 much simpler and easier to implement because all you need to do is focus on the logo, header, navigation, breadcrumb, portlets, and footer.

Another important part of the theme upgrade is to handle the jQuery library. As you might have known already, Liferay Portal 6 has introduced Alloy UI, which is based on **HyperText Markup Language 5** (**HTML5**), **Cascading Style Sheets Level 3** (**CSS3**), and **Yahoo User Interface** version **3** (**YUI3**). The widely used jQuery in Liferay 5.x is not packaged in Liferay Portal 6. However, you might have jQuery in your custom portlets. In order to support the jQuery functionalities in your portlets, you need to package the jQuery library in the `jquery-1.4.4.min.js` file, which can be downloaded from the jQuery site at `http://code.jquery.com/jquery-1.4.4.min.js` and the hypertext link should be changed to `http://code.jquery.com/jquery-1.4.4.min.js` as well, in your own theme. Your custom jQuery script files such as `my-custom.js` can also be packaged in your upgraded theme. This can be done by adding the following lines in the `portlet_normal.vm` file in the `${PLUGINS_SDK_HOME}/themes/{your-custom-theme}/docroot/_diffs/templates/` folder:

```
</body>
#js("$javascript_folder/jquery-1.4.4.min.js")
#js("$javascript_folder/my_custom.js")
$theme.include($bottom_include)
</html>
```

Of course, you also need to add both the mentioned JavaScript files in the `${PLUGINS_SDK_HOME}/themes/{your-custom-theme}/docroot/_diffs/js/` folder.

Creating a FreeMarker template theme

The default templates are Velocity templates in the Liferay themes. This can be verified by looking at the following highlighted line in the `${PLUGINS_SDK_HOME}/themes/build-common-theme.xml` file:

```
<if>
  <not>
    <isset property="theme.type" />
  </not>
```

```
  <then>
    <property name="theme.type" value="vm" />
  </then>
</if>
```

Liferay engineers can now create a theme with **FreeMarker** templates in Liferay portal. To create a FreeMarker theme, we need to update the theme type to FreeMarker. This can be done by following the procedure given next:

1. In the `${liferay.plugins.sdk.home}/themes/` folder, run the following command:

   ```
   create.bat|./create.sh] freemarker "FreeMarker Theme"
   ```

2. Add a `theme.type` line in the `${PLUGINS_SDK_HOME}/themes/freemarker-theme/build.xml` file as shown next:

   ```
   <property name="theme.type" value="ftl"></property>
   <property name="theme.parent" value="classic"></property>
   ```

3. Copy the `css`, `images`, `js`, and `templates` folders from the `${PORTAL_ROOT_HOME}/html/themes/classic/` directory to the `${PLUGINS_SDK_HOME}/themes/freemarker-theme/docroot/_diffs/` folder.
4. Ant-deploy the FreeMarker theme to a running Liferay environment. The `freemarker-theme-{version.number}.war` file will be deployed.
5. Copy the `${PORTAL_ROOT_HOME}/webapps/freemarker-theme/WEB-INF/liferay-look-and-feel.xml` file to the `${PLUGINS_SDK_HOME}/themes/freemarker-theme/docroot/WEB-INF/` folder.
6. Update the `${PLUGINS_SDK_HOME}/freemarker-theme/docroot/WEB-INF/liferay-look-and-feel.xml` file as follows:

   ```
   <look-and-feel>
     <compatibility>
       <version>6.0.5+</version>
     </compatibility>
     <theme id="freemarker" name="FreeMarker">
       <template-extension>ftl</template-extension>
     </theme>
   </look-and-feel>
   ```

7. Ant-deploy the FreeMarker theme again.

Now you have a Liferay theme that uses FreeMarker templates. Right now, it looks the same as the original Liferay Classic theme that uses Velocity templates.

What are the theme variables available in the FreeMarker templates? Just like the Velocity templates, you have all the theme variables necessary for creation of a theme in the FreeMarker templates. These variables are defined in the `com.liferay.portal.freemarker.FreeMarkerVariables.java` file and the `${PORTAL_ROOT_HOME}/html/themes/_unstyled/init.ftl` file. Here are some examples:

- `htmlUtil`
- `languageUtil`
- `themeDisplay`
- `company`
- `user`
- `layout`
- `scopeGroupId`
- `permissionChecker`
- `colorScheme`
- `user_id`
- `is_default_user`
- `language`
- `show_control_panel`
- `bottom_include`
- `date`
- `the_year`

Theme coding conventions

One of the best practices in Liferay theme engineering is to follow some coding conventions in the theme development. You can save time, avoid pitfalls, and make your code consistent by following these standards and conventions.

Cascading style sheet conventions

The following snippet of CSS code is taken from the `${PORTAL_ROOT_HOME}/html/themes/_styled/css/application.css` file.

```
/* ---------- Menus ---------- */

.lfr-actions.portlet-options .lfr-trigger strong span, .visible.
portlet-options .lfr-trigger strong span {
    background-image: url(../images/portlet/options.png);
}
```

You can see that the Liferay developers observe the following rules in CSS coding:

- Use a comment line to group-related selectors
- Put one blank line between the selectors and the comment
- Separate multiple selectors with a comma and a newline
- Leave one space between the selector name and the starting `"{"`
- Indent the declarations with one tab
- Put a space between the property name and its value in the declaration
- Leave no space between the URL and the opening `"("` for a background image property
- Use a relative URL path instead of an absolute one

Image folder and file conventions

Liferay uses a lot of images as part of themes. These images files are collectively put in, say, the `${PORTAL_ROOT_HOME}/html/themes/classic/images/` directory for the Classic theme. Within this directory, the image files are further grouped in different subfolders. Here are some examples:

- `add_content`: Images files for the **Add Application** functionality
- `application`: Commonly used image files for all applications
- `arrows`: All shapes of arrow images
- `aui`: Image files used by the newly developed Alloy UI library
- `blogs`: Image files used by the blog portlet and web content portlet

Only alphabetical characters (in lowercase) and underscores are allowed in the image folder names and filenames, such as the following:

- `color_schemes`
- `dockbar`
- `image_gallery/slide_show.png`
- `trees/root.png`

JavaScript coding conventions

Liferay has a **minifier filter** that is used to remove empty lines and extra spaces in the page markup file before the application server sends it to a browser. The purpose of this minifier filter is to reduce the bytes to be sent and thus improve network speed.

In some Liferay versions this minifier filter removes the comments in the JavaScript functions, while in other versions it does not. This has impact on the way we code in JavaScript. Here is an example.

```
function showMessage()
{
  // comment
  alert("Hello World!");
}
```

This function will work without the minifier filter. When the minifier filter is working, it removes the extra spaces. The function becomes as follows:

```
function showMessage(){// comment alert("Hello World!");}
```

Now the browser will complain that the `showMessage` function is not defined. The lesson here is that we should always use multiline comment signs in JavaScript coding, as seen in the following snippet of code:

```
function showMessage()
{
  /* comment */
  alert("Hello World!");
}
```

In this case, even if the function is *minified*, it will still work. This is also true for the functions defined in separate JavaScript files.

The following code works fine without the minifier filter:

```
function <portlet:namespace />validateprofile(frm)
{
  var re = /^[a-zA-Z\.-\s]+$/;
  if(!re.test(frm.<portlet:namespace />firstName.value)) {
    alert("First name contains invalid characters!");
    return false;
  }
  // ignore details
}
```

After the minifier filter is applied, the previous code becomes as follows:

```
function <portlet:namespace />validateprofile(frm){ var re = /^[a-zA-
Z\.-\s]+$/; if(!re.test(frm.<portlet:namespace />firstName.value)) { …
} ... }
```

The browser will complain about an invalid character set (in the regular expression). It will say that the `validateprofile` function is not defined. To fix this, we need to use the `RegExp` object:

```
function <portlet:namespace />validateprofile(frm)
{
  var re = new RegExp('^[a-zA-Z- \.]+$');
  if(!re.test(frm.<portlet:namespace />firstName.value)) {
    alert("First name contains invalid characters!");
    return false;
  }
}
```

It is also advisable to use a good tool for JavaScript code debugging.

Brower compatibility

Many CSS styles are displayed differently in different browsers. This is because while major modern browsers support CSS according to the **World Wide Web Consortium** (**W3C**) specifications, they implement some CSS rules in different ways.

In order for a custom theme to look the same in different browsers, we need to pay attention to three aspects in our theme composing—specifying a DOCTYPE, using CSS reset styles, and limited support of CSS3 in the Internet Explorer 6, 7, and 8.

Specifying a DOCTYPE

Modern browsers have two rendering modes—standards mode and quirks mode. In **quirks mode**, a browser renders pages written for older browsers. The quirks mode is for backward compatibility. In **standards mode**, a browser works according to the W3C specifications as closely as possible. The standards mode complies with W3C standards.

In theme coding, we use the `DOCTYPE` tag to tell a browser that a theme follows standards. After this theme is applied to a page, the browser will render this page according to W3C specifications. One example of the `DOCTYPE` tag is as follows:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

This markup is used in the Classic theme in Liferay Portal 5.x. This XHTML 1.0 Transitional DOCTYPE will tell a browser to switch to standards mode for rendering this page.

The `DOCTYPE` should be the first tag in the document.

In the `portal_normal.vm` file for the Classic theme in Liferay Portal 6, you will find the HTML5 DOCTYPE as follows:

```
<!DOCTYPE html>
```

Using CSS reset styles

A page may still look different in two different browsers even when both the browsers are rendering the page in standards mode. For example, the `<ul>` tag gets padding in Firefox but a margin in Internet Explorer. To make the `<ul>` tag look the same in both Firefox and Internet Explorer, we use the following CSS reset style:

```
* {
  padding: 0;
  margin: 0;
}
```

The `*` is a universal selector. This style resets the padding and margins on all the elements to zero. Now it does not matter whether the `<ul>` tag has padding or a margin because both the attributes have the same value—zero. The `<ul>` tag will look the same in both, Firefox and Internet Explorer.

You will find such styles in a `base.css` file of a Liferay theme. The following is a snippet of code from that file:

```
/* ---------- Browser normalization ---------- */
body, div, dl, dt, dd, ul, ol, li, h1, h2, h3, h4, h5, h6, pre, form,
fieldset, input, textarea, p, blockquote, th, td {
  margin: 0;
  padding: 0;
}
```

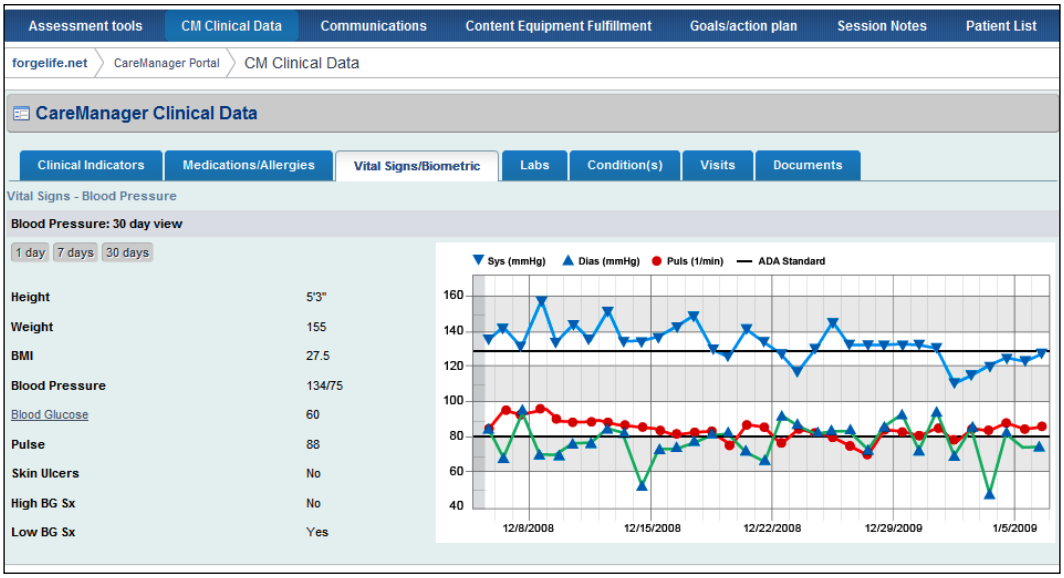
This solution is called **browser normalization** in Liferay.

Limited support of CSS3 in Internet Explorer 6, 7, and 8

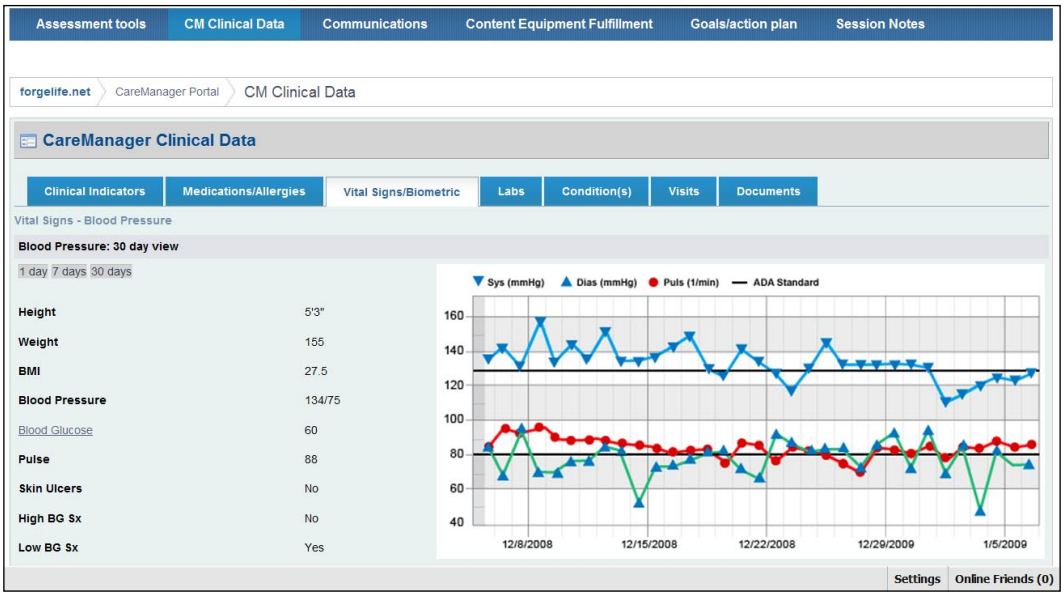
One of the nice features in CSS3 is to use the border-radius property, as seen in the code snippet that follows, in order to create rounded corners with CSS3 easily, without the need for corner images or the use of multiple `<div>` tags. This is perhaps one of the most talked about aspects of CSS3.

```
-moz-border-radius: 15px;
```

This property is supported well in Firefox, Safari, Google Chrome, and IE 9 browsers. The following screenshot, which was taken in Firefox 3.6, shows how the tabs are displayed with rounded corners without using corner images:



IE 6, 7, and 8 do not sufficiently support CSS3. Particularly, the previous property is not supported. Therefore, the same tabs controlled by the same CSS3 code appear differently (with straight corners) in IE 6, 7 and 8. Refer to the following screenshot taken in IE 7:



Dealing with browser bugs

When the previous measures still do not work or you have to deal with a browser bug, you can add browser prefix to a style to target a specific browser issue.

The following code is from the `custom.css` file of the Liferay Classic theme:

```
.ie6 #wrapper {
  width: 90%;
}
```

This style is for Internet Explorer 6 only. For a `<div>` block whose ID is `wrapper`, its width is specified as relatively 90%.

Development tools

As you can see from the `portal_normal.vm` file, the rendering of a theme is the rendering of a whole web page. Any tool suitable for web application development may be usable for theme development. Especially you may use the following tools in writing a theme.

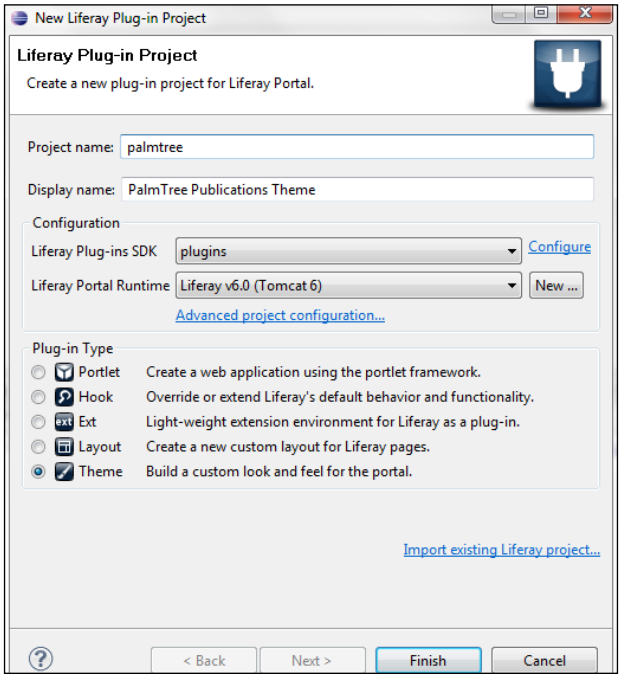
Liferay IDE in Eclipse

Eclipse is a multi-language software development environment comprising an **Integrated Development Environment** (**IDE**) and an extensible plugin system. It is written primarily in Java (and can be used to develop applications in Java) and also, by the means of various plugins, other languages.

Liferay IDE is an extension for the Eclipse platform that supports development of plugin projects for the Liferay portal platform. It is available as a set of Eclipse plugins, installable from an update site. The latest version supports five types of Liferay plugins—portlets, hooks, layout templates, themes, and EXT-style plugin. Liferay IDE requires the Eclipse Java EE developer package of versions Galileo or Helios. For more details, please visit the Liferay IDE wiki page at `http://www.liferay.com/community/wiki/-/wiki/Main/Liferay+IDE`. There are multiple wiki pages available for helping to set up the IDE and create theme plugin in the IDE.

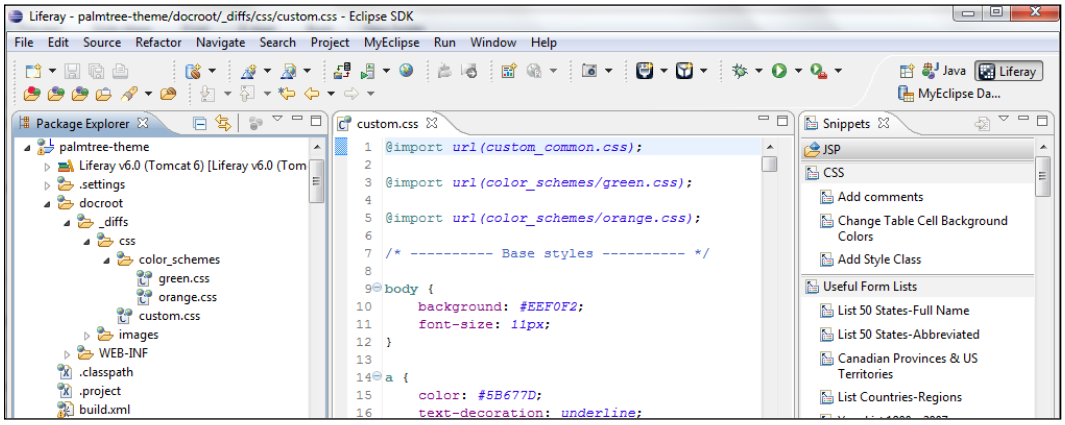
Both Liferay Portal and Liferay Plugins SDK can be integrated in this Liferay IDE running on Eclipse platform. You can include the runtime environment and set up debugging tools among other features, as you are able to do for other J2EE and web projects in Eclipse. You can also download and install Quantum DB and Subversion plugins so that you can connect to Liferay database and check in/out code with Subversion. This IDE can significantly improve your Liferay engineering efficiency.

The following screenshot shows that you can create a Liferay Plugin project in Liferay IDE:


New Liferay Plug-in Project
Liferay Plug-in Project
Create a new plug-in project for Liferay Portal.
Project name: palmtree
Display name: PalmTree Publications Theme
Configuration
Liferay Plug-ins SDK plugins Configure
Liferay Portal Runtime Liferay v6.0 (Tomcat 6) New ...
Advanced project configuration...
Plug-in Type
Portlet Create a web application using the portlet framework.
Hook Override or extend Liferay's default behavior and functionality.
Ext Light-weight extension environment for Liferay as a plug-in.
Layout Create a new custom layout for Liferay pages.
Theme Build a custom look and feel for the portal.
Import existing Liferay project...
< Back
Next >
Finish
Cancel

After the theme plugin is created in the Liferay IDE, you can add all the necessary files, including CSS, images, JavaScript, and Velocity templates to your theme folders. Any code changes, whenever saved, will trigger the build process and the modified theme will be deployed in the runtime environment for verification.

The following screenshot shows a theme plugin project in Liferay IDE:



ViewDesigner Dreamweaver plugin

Web designers would be more comfortable using web designer tools such as Dreamweaver or FrontPage to design the themes rather than using text-based editors. The current approach of putting the CSS changes in the `_diffs` folder, and doing an ANT to create the theme **Web application ARchive** (**WAR**) file is not what web designers are used to.

ViewDesigner helps the web designers to easily create or modify Liferay Themes. It is an open source project licensed under **Common Development** and **Distribution License** (**CDDL**). While it currently supports only Windows, a Mac version will be available shortly. For more details, please visit the wiki page at `http://www.liferay.com/web/guest/community/wiki/-/wiki/Main/Theme+Development+using+the+ViewDesigner+Dreamweaver+Plugin`.

W3school site

You can validate your webpage HTML markup, CSS files, and XHTML files at `http://www.w3schools.com/site/site_validate.asp`. You can simply enter the URL of your page or file, and click on **Validate the page** button. Your page or file must be on a running application server or servlet container.

Firebug

Firebug usually integrates with the Firefox browser. It is a powerful web development tool. You can check the HTML markup and styles of your site in real time with Firebug. Firebug is especially useful in debugging JavaScript code. While some browser is murmuring that there is something wrong with your JavaScript, Firebug will directly tell you that the definition of a particular function is missing.

Yslow

Yslow is a Yahoo! web development tool. It is a Firefox add-on and integrates with Firebug. Yslow can analyze your web pages and give suggestions in performance improvement. You can read more about Yslow at `http://developer.yahoo.com/yslow/`.

Google Chrome

Google Chrome has the following tools to help you test your website:

- Web Inspector: It has an hierarchy view of the document object models and a JavaScript console
- Task Manager: It shows all the Google Chrome processes that are running
- JavaScript Debugger

Summary

In this chapter, we have discussed some of the advanced aspects of theme development in Liferay portal 6. In particular, we have learned that:

- A theme developer can specify the value of the `theme.parent` property to create a theme based on an existing theme
- By adding color schemes to a theme, we get variations of a single theme
- A theme designer can hide the portlet borders by changing a theme setting or through configuration in the portlet UI
- There are different ways to embed instanceable and non-instanceable portlets in a theme
- It is easier to upgrade a theme based on a theme that is already running in the target version
- FreeMarker-template-based themes are now available in Liferay
- To write a good theme, a designer should pay attention to coding conventions, browser compatibility, and choice of development tools

In the next chapter, we will investigate the topic of portlet user interfaces.

6
Portlet User Interface

Portlets are basic components of a portal page. A good-looking site has to have a well-formatted user interface (UI) for its portlets. This chapter familiarizes you with the following aspects of portlets in Liferay portal:

- Multiple portlets support
- Deploying a portlet
- Portlet and layout
- Portlet content and portlet template
- Portlet chrome customization
- Normal view and maximized view of a portlet
- **AJAX** for portlet UI
- Portable Document Format (PDF) reports and Excel reports
- Vaadin portlets
- Common tags in portlets
- Customizing portlet UI using **hook**

We will use practical examples to explain these points.

The making of a portlet

A portlet, as the name suggests, is a part of a portal. The making of a portlet is similar to the process of writing a **servlet**. The major differences are:

- A portlet produces only a fragment of the HTML markup of a portal page. So it will not include the `<html>`, `<head>`, or `<body>` markup. The portal will combine the fragments of HTML markup from several portlets and create the full portal page.

- The Java class responsible for processing the portlet requests must inherit from the `javax.portlet.Portlet` class; a **servlet** class must inherit from the `javax.servlet.http.HttpServlet` class.
- A portlet request goes through two phases:
    - **Action phase**: The request is processed in the `processAction` method. This is an optional phase.
    - **Render phase**: A `render` method is called. HTML markup is generated in this phase. In some situations, the portlet request goes directly to the render phase.

A portlet runs in a portlet container. Liferay portal is such a portlet container. Liferay portal provides a theme for a portal page, offers a layout for locating portlets and runs portlets. It also provides additional functionalities including user and organization administration, permission control, and e-mail notification, among others.

Multiple portlets support

Liferay portal supports the following portlets:

- JavaServer Page (JSP) portlets
- Struts portlets
- JavaServer Faces (JSF) portlets
- Vaadin portlets
- Spring Model–View–Controller (MVC) portlets

JSP portlets

These are the simplest portlets in Liferay. Some out-of-the-box portlets of Liferay are written as JSP portlets. You can easily add Liferay's UI tags to a JSP portlet. Because the logic of a JSP portlet is simple, other developers can quickly understand it and continue with the implementation if the former developer is busy with a new project. Some developers like the JSP portlets, especially when a client's project schedule is very tight. Build files are available in Liferay's Plugins SDK for automatic generation of a default JSP portlet.

Struts portlets

Struts portlets follow the MVC design pattern. Struts is one of the most mature portlet technologies. You write a portlet class that inherits from the `com.liferay.portlet.StrutsPortlet` class. Then you use `struts-config.xml` and `tiles-defs.xml` to configure the portlet. The `struts-config.xml` file defines the page flow while the `tiles-defs.xml` file defines the page layout. There are sample Struts portlet **Web Application Archive** (**WAR**) files available for free download from the community downloads page at the Liferay site. You can get Struts portlets and Struts 2.0 portlets there. The Struts 2.0 sample portlet uses a form with dependency injection to show how to use that new framework.

JSF portlets

These portlets are based on Sun's JavaServer Faces APIs, which have been designed to make Web application development easier. On the community downloads page of Liferay, you can get WAR files for both JSF 1.1 and JSF 1.2 portlets.

Vaadin portlets

The Vaadin portlets are newly supported in Liferay portal, although they can run in old versions through manual installation of shared Vaadin library JAR files and shared resources.

Vaadin portlets are interesting—you write a whole portlet purely in server-side Java. You do not have to worry about HTML, CSS, JavaScript, or browser compatibility, which are all taken care of in the Vaadin framework. One section in this chapter is devoted to writing Vaadin portlets.

Spring MVC portlets

Liferay portal also accepts Spring MVC portlets. Spring is famous for its aspect-oriented-programming feature. In a Spring portlet, multiple steps are involved in the rendering of the portlet. You can download a simple Spring portlet WAR files at the Liferay site. A Spring portlet includes two custom configuration files: `applicationContext.xml` and `${PORTLET_NAME}-portlet.xml`.

A good starting point for portlet coding is to download a sample portlet package from the community downloads at `http://www.liferay.com`. You can then customize it. This complies with an important programming practice: Make it run first, and then make it work.

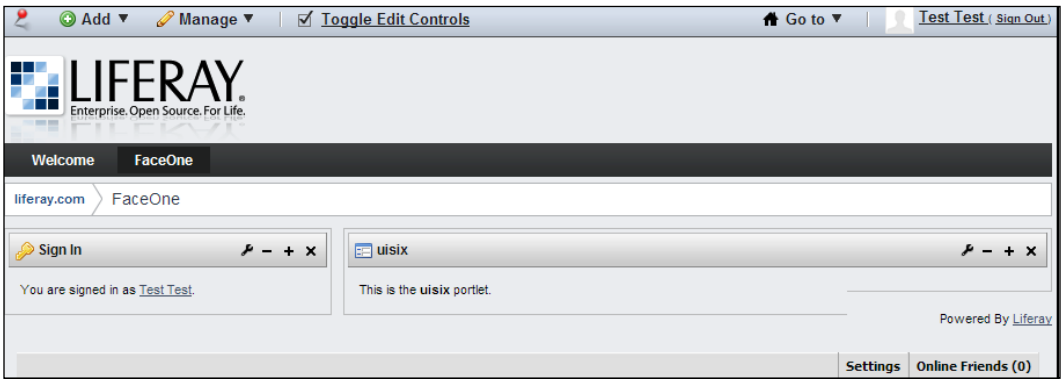
Deploying a portlet

In this section, we will use a JSP portlet to illustrate the portlet user interface.

Assume that the **Liferay Plugins SDK** has been set up in **Eclipse**. The Application Server (AS), or servlet container, has been installed and is running.

1. Go to folder `$PLUGINS_SDK_HOME/portlets` and run `create.bat uisix uisix` command. This will create a `uisix-portlet` directory in the `portlets` folder—this is the `uisix-portlet` portlet.
2. Go to **Eclipse** and refresh the `$PLUGINS_SDK_HOME` project. You will see the `uisix-portlet` folder.
3. Deploy the `uisix` portlet. This will create a `uisix-portlet-${VERSION}.war` file and copy it to the `${AS}/deploy` folder.
4. If the AS is running, Liferay portal will detect the existence of `uisix-portlet-${VERSION}.war`. It will pick it up and automatically deploy it. When you see the **1 portlet for uisix-portlet** is available for use message in the log file, the `uisix-portlet` has been successfully deployed.
5. Open a browser and go to `http://localhost:8080/`. Log in as `test@liferay.com / test`. Click on **Add | Page** and input **FaceOne**. Click on the tick—you have created a page named **FaceOne**. Click on the **FaceOne** page name. Click on **Add | More ...** Expand the **Sample** category and find the **uisix** portlet. Add it onto the current page. There it is, with a message: **This is uisix.** Drag and drop the **uisix** portlet to the right-hand side of the page.
6. Click on **Add | More ...** again. Expand the **Tools** category and add the **Sign In** portlet to the page—it will reside on the left-hand side of the page.

Let us have a look at the screenshot before we forget it.



We will test our user interface code in this **uisix-portlet**.

Portlet and layout

A layout divides a portal page into several areas in Liferay portal. One or more portlets can be put in each area. As you can drag and drop a portlet to any area in a layout, you can change the user interface dynamically.

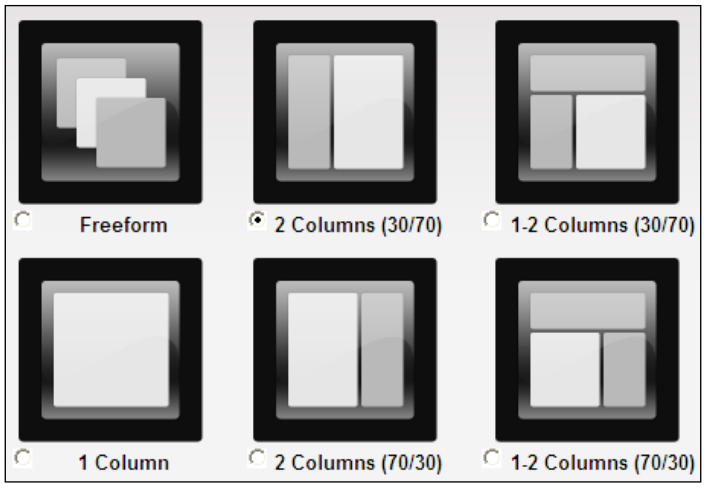
As a word of caution, layout may mean portal page in certain contexts in Liferay. That is why the `layout` database table contains all the data about a portal page in Liferay.

This is the benefit of a portal, or, Liferay portal: you can apply any layout to a page. Theoretically, you can put any portlet in any area of a layout. By drag-and-drop, you can change the outlook of your site in minutes, giving a surprise to frequent visitors to your site.

There are ten default layouts in Liferay portal, which basically meet the requirements for most pages in an enterprise portal. (Of course, you can also create your own layouts in Liferay.) The default layouts are:

- Freeform
- 1 Column
- 2 Columns (50/50)
- 2 Columns (30/70)
- 2 Columns (70/30)
- 3 Columns
- 1-2 Columns (30/70)
- 1-2 Columns (70/30)
- 1-2-1 Columns
- 2-2 Columns

Let us find out which layout is used on the **FaceOne** page where our **uisix-portlet** resides. Move the cursor to the **Manage** drop-down menu at the top on the left-hand side of the page and click on **Page Layout**. A pop-up window will show. Part of the screenshot is as follows:



The **2 Column (30/70)** layout is checked. This means that this layout is applied to the **FaceOne** page. That is why, in the first screenshot of this chapter, the **Sign In** portlet occupies a small cell on the left-hand side of the page while the **uisix** portlet is taking the right-hand side cell, which has a 70% width.

You may also have noticed that there is a **1 Column** layout in the screenshot above at its bottom left corner. This is also a frequently used layout. If you want to apply this layout to a portal page, use the following steps:

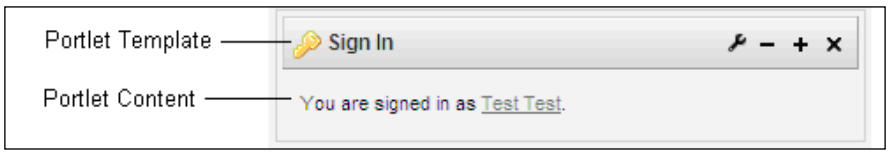
1. Click the red **x** icon to close the layout pop-up.
2. Add another page named **FaceTwo**.
3. Click on the **FaceTwo** page name. Move your cursor to the **Manage** drop-down menu at the top left-hand side. Click on the **Page Layout** link.
4. Choose the **1 Column** layout and click on **Save**—you have applied the **1 Column** layout to the **FaceTwo** page.
5. Add the **uisix** portlet onto the **FaceTwo** page. The **uisix** portlet now occupies the whole page.

When you add a page, the browser did not refresh. However, the next time you visit your site, the **FaceTwo** page will still be there. How was it saved into the database? It was saved through an **AJAX** method call.

Portlet content and portlet template

A portlet in Liferay has two parts:

- **Portlet content**: The internal part that shows text and/or images to a user.
- **Portlet template**: The external part that contains icons for configuration of the portlet. This part can be customized with a theme.



When a portlet is rendered, Liferay draws a box around it. This behavior has been configured in a `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/liferay-portlet.xml` file. The outlook of this box can be completely customized by the template file `$AS_ROOT_HOME/html/common/themes/portlet.jsp`. This file is responsible for drawing the template box, as shown in the figure above.

The `$AS_ROOT_HOME/html/common/themes/portlet.jsp` template will draw the buttons that control the portlet, that is:

- Look-and-feel and configuration
- Minimize
- Maximize
- Close
- Move up
- Move down
- Preferences (when edit mode is supported)
- Help (if help mode is supported)

The portal initializes context variables to tell the template which of these buttons to show.

Besides the portlet template, the portlet content can also be controlled. This is done through a Cascading Style Sheet (CSS) file and a JavaScript file that are packaged along with the portlet WAR file. The CSS file and the JavaScript file are specified through the following code in the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/liferay-portlet.xml` file.

```
<header-portlet-css>/css/portlet.css</header-portlet-css>
<footer-portlet-javascript>/js/javascript.js</footer-portlet-
javascript>
```

Customizing portlet chrome

A portal page can contain multiple portlets. A portlet is a dynamic part of a portal page. In this section we will talk about how to customize a portlet.

What is portlet chrome?

In the following screenshot, the following parts are collectively called **Portlet Chrome**:

- The little icon at the top left-hand side corner of the portlet
- The portlet title of **uisix**
- The wrench-shaped icon for **Look and Feel** and **Configuration**
- The minimize icon of **-**
- The maximize icon of **+**
- The removal icon of **x**

We can control the appearance of the portlet chrome with a theme or a style sheet.

The portlet icon is specified by the following configuration in the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/liferay-portlet.xml` file:

```
<portlet>
  <portlet-name>uisix</portlet-name>
  <icon>/icon.png</icon> <!-- It is this line -->
  // ignore details
</portlet>
```

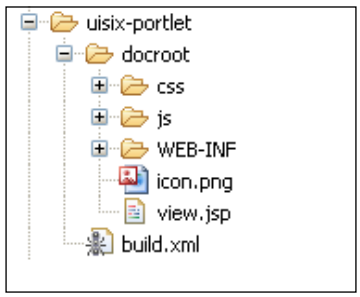
The portlet title is specified by the following line in the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/portlet.xml` file:

```
<portlet-info>
  <title>uisix</title>
  <short-title>uisix</short-title> <!-- It is this line -->
  <keywords>uisix</keywords>
</portlet-info>
```

How to customize the portlet icon

Refer to the following screenshot. Have you noticed the `icon.png` file under the `uisix-portlet/docroot` directory? You can replace this image file to get a customized icon for your own portlet.

Please make sure that your custom icon is of the same size as this icon. Otherwise it will not align correctly with the text.



What if you want to hide this icon? You need to create a custom theme, say, `uisix` theme, for the `uisix-portlet` page. Then, in the `$PLUGINS_SDK_HOME/themes/uisix-theme/docroot/_diffs/templates/portlet.vm` file, you find the following lines. If you delete the `$theme.iconPortlet()` part, the icon will not show any more.

```
<h1 class="portlet-title">
$theme.iconPortlet() <span class="portlet-title-text">$portlet_title</
span>
</h1>
```

If you want to remove the wrench-shaped icon for **Look and Feel** and **Configuration**, you can add the following code to your portlet JSP file:

```
<%
ThemeDisplay themeDisplay= (ThemeDisplay)renderRequest.
getAttribute(WebKeys.THEME_DISPLAY);
PortletDisplay portletDisplay= themeDisplay.getPortletDisplay();
portletDisplay.setShowConfigurationIcon(false);
%>
```

Normal view vs. maximized view

You can click on the **-** icon to minimize a portlet. When you minimize a portlet, the part of the portlet that is still visible is the **Portlet Chrome**.

When you click on the **+** maximize button, the said portlet will occupy the whole portal page. The **Return to Full Page** link will show on the top right-hand side corner. You can click on this link to revert the portlet to its normal state.

AJAX for portlet user interface

We can use **AJAX** to add or change page content without refreshing the portal page. In this way we improve performance in user-site interaction—it is an interesting UI experience. This is achieved by using the resource URL with **AJAX**. We will implement this in the **uisix** portlet:

1. Create `src/com/sample/jsp/portlet/JSPPortlet.java` in the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF` directory.
2. In the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/portlet.xml` file, change `<portlet-class>com.liferay.util.bridges.mvc.MVCPortlet</portlet-class>` into `<portlet-class>com.sample.jsp.portlet.JSPPortlet</portlet-class>`.
3. Refresh the `$PLUGINS_SDK_HOME` project in Eclipse. If necessary, include `portal-kernel.jar`, `portal-service.jar`, and `portlet.jar` files in the Java build path.
4. Download the following files:
    - `http://ajax.googleapis.com/ajax/libs/jqueryui/1.8/themes/base/jquery-ui.css`
    - `http://ajax.googleapis.com/ajax/libs/jquery/1.4/jquery.min.js`
    - `http://ajax.googleapis.com/ajax/libs/jqueryui/1.8/jquery-ui.min.js`
5. Put the above downloaded files in the **uisix** portlet as follows:

```
$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/css/ajax/libs/jqueryui/1.8/themes/base/jquery-ui.css
$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/js/ajax/libs/jquery/1.4/jquery.min.js
$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/js/ajax/libs/jqueryui/1.8/jquery-ui.min.js
```

6. In the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/view.jsp` file, add the following lines:

```
<link href="<%= themeDisplay.getPortalURL() + request.
getContextPath() %>/css/ajax/libs/jqueryui/1.8/themes/base/jquery-
ui.css" rel="stylesheet" type="text/css"/>
<script src="<%= themeDisplay.getPortalURL() + request.
getContextPath() %>/js/ajax/libs/jquery/1.4/jquery.min.js"></
script>
<script src="<%= themeDisplay.getPortalURL() + request.
getContextPath() %>/js/ajax/libs/jqueryui/1.8/jquery-ui.min.js"></
script>
// ignore details
ResourceURL currentResUrl = renderResponse.createResourceURL();
currentResUrl.setParameter("updateType", "ajax");
// ignore details
<table style="width:100%">
  <tr>
    <td style="width:25%">
      <a href="javascript:;" onclick="$('#<portlet:namespace
/>content').load('<%= currentResUrl.toString() %>');return false;"
>Sports</a>
    </td>
    <td style="width:75%">
      <div id="<portlet:namespace />content">
        It is coding time.
      </div>
    </td>
  </tr>
</table>
```

7. In the `serveResource` method of the `com.sample.jsp.portlet.JSPPortlet` class, delete any existing code and add the following code:

```
String updateType = ParamUtil.getString(req, "updateType");
if("ajax".equals(updateType)){
  res.setContentType("text/html");
  PrintWriter out = res.getWriter();
  StringBuilder strB = new StringBuilder();
  strB.append("Now let us take a break.\n");
  strB.append("It is sports time.");
  out.println(strB.toString());
  out.close();
}
```

The `<table>` tag is used for formatting. We use a link to activate the AJAX functionality. We use jQuery JavaScript API to do it. It loads content with a resource URL and places the content in a `<div>` area whose ID is `content`.

The `serveResource` method serves content without decoration. It delivers text, HTML markup, an image or a PDF file. In the snippet of code above, it does these:

- Specify the content type as **text/html**. The content is text of two sentences.
- Use the `PrintWriter` object of the `ResourceResponse` object to print the content. After that, the application closes the `PrintWriter` object.

Re-deploy the **uisix** portlet. Now when you click on the newly-shown **Sports** link, the existing **It is coding time** message will be changed to **Now let us take a break**. **It is sports time**. The page was not re-loaded, but the content has changed. This means that you have made AJAX work in your portlet.

You can use this process to access your database and show corresponding information on the portal page—this is your homework.

PDF and Excel reports

If you can use a portlet to generate a PDF or an Excel file, it will give your users another UI experience. PDF and Excel files are often used as reports in Web applications. The feature of PDF file generation may come in handy sometimes – a future client may ask for that.

Using a portlet to generate PDF files became possible with the adoption of the **JSR 286 Specification** (**JSR 286**). Prior to **JSR 286**, PDF files were generated with servlets, even in Liferay portal. The **JSR 286 Specification** adds a resource URL into the portlet. This URL allows you to generate text, HTML, binary files and images into a portal page, without any customization from themes.

Based on the existing code in the **uisix** portlet, we implement the PDF and Excel reports as follows:

1. Download `itext-2.0.8.jar` and `poi-3.5-beta1.jar` into the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/lib` directory
2. Add the following code to the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/view.jsp` file:

```
<table>
  <tr>
    <td>
```

```
      <input type="button" value="PDF Report" onClick="location.
href = '<portlet:resourceURL><portlet:param name="reportType"
value="pdf" /></portlet:resourceURL>'" />
    </td>
    //ignore details
    <td>
      <input type="button" value="Excel Report" onClick="location.
href = '<portlet:resourceURL><portlet:param name="reportType"
value="excel" /></portlet:resourceURL>'" />
    </td>
  </tr>
</table>
```

3. Add the following code to the `serveResource` method of the `com.sample.jsp.portlet.JSPPortlet.java` file:

```
Document document = new Document();
//ignore details
document.open();
document.add(new Paragraph(msg));
//ignore details
document.close();
res.setContentType("application/pdf");
//ignore details
OutputStream out = res.getPortletOutputStream();
baos.writeTo(out);
out.flush();
out.close();
// ignore details
Workbook wb = new HSSFWorkbook();
// ignore details
Sheet sheet = wb.createSheet("new sheet");
Row row = sheet.createRow((short)0);
Cell cell = row.createCell(0);
cell.setCellValue(1);
row.createCell(1).setCellValue(1.2);
//ignore details row.createCell(2).setCellValue(createHelper.creat
eRichTextString("This is a string"));
row.createCell(3).setCellValue(true);
res.setContentType("application/vnd.ms-excel");
OutputStream out = res.getPortletOutputStream();
wb.write(out);
out.flush();
out.close();
```

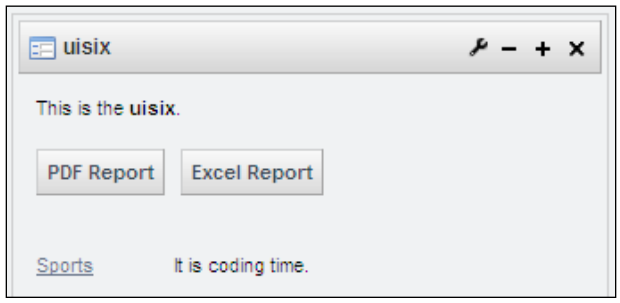
The newly-added JSP code includes a **PDF Report** button. A resource URL is associated with this button. In that URL the `reportType` is specified as `PDF`.

The JSP code also includes an **Excel Report** button. In the resource URL associated with it, the `reportType` is specified as `excel`.

In the newly-added Java code, if the report type is `PDF`, a `Document` object is initialized. A byte array output stream is created for writing content into this `Document` object. Then the `Document` object is opened. Two paragraphs are written into it before it is closed. In the response object, the content type is set as `application/pdf`. Then the content is written to the portlet output stream. The output stream is flushed and closed.

If the report type is `excel`, a `Workbook` object is initialized. A spreadsheet is created in this workbook. Then a row is created in this spreadsheet—the row index starts at zero. Cell 0 is created in this row; its value is set to 1. Then Cell 1 is created; its value is set to 1.2. Cell 2 is created and its value is set to `This is a string`. Then Cell 3 is created and its value is set to `true`. In the response object, the content type is set to `application/vnd.ms-excel`. Then the content is written to the portlet output stream. After that the output stream is flushed and closed.

Now we re-deploy the **uisix** portlet. You will see a screen as follows:



When you click on the **PDF Report** button, a PDF file will be generated in the browser; when you click on the **Excel Report** button, an Excel report will be generated.

Vaadin portlets

Vaadin portlets are developed with Vaadin framework. The Vaadin framework can also be used to develop standalone web applications. Liferay portal supports the Vaadin portlets.

In this section, we will write a Vaadin portlet for Liferay portal using the Vaadin **Eclipse** plugin.

Required software

Install the following software for the development environment, if they are not already there:

- **Eclipse** Java EE IDE
- Liferay portal 6.x.x with Tomcat 6.0.x

Configuring Tomcat 6.0 in Eclipse

If you have not already done so, configure Tomcat 6.0 in **Eclipse** as follows:

1. Start **Eclipse**. Click on **Window | Preferences**.
2. Expand **Server**. Click on **Runtime Environment**.
3. Click on **Add ...**.
4. Select **Apache Tomcat v6.0. Click on Next**.
5. Click on **Browse** and open the **tomcat-6.0.x** directory.
6. Click on **Finish**.

Installing Vaadin Eclipse plugin

You can automatically create a Vaadin portlet prototype for Liferay portal with the Vaadin **Eclipse** plugin. Here is how you can install it:

1. Assuming that **Eclipse** is open. Click on **Help**. **Select Install New Software ...**.
2. Click on **Add ...**.
3. **Input Name: Vaadin**, **Location:** `http://vaadin.com/eclipse`. Click on **OK**.
4. Click on **Finish**.

The Vaadin **Eclipse** plugin will be installed. It will take several minutes.

Creating a Vaadin project

We can now create a Vaadin project with the Vaadin **Eclipse** plugin. Our Vaadin portlet will be written in this Vaadin project. Here is the procedure:

1. Click on **File | New | Project ...**.
2. Expand **Vaadin**. Select **Vaadin Project**. Click on **Next**.

3. Input **Project name**: **FirstVaadin**. For **Project location**, **Use default location** is automatically checked. Input **Target runtime**: **Apache Tomcat v6.0**, **Configuration**: **Default Configuration for Apache Tomcat v6.0**. For **Deployment configuration**, select **Generic portlet (Portlet 2.0)**. For **Vaadin version**, if Vaadin has not yet been installed, click on **Download...**. Install the latest version of Vaadin, say, 6.4.3. Click on **Next**.
4. Use default values for the following windows. Click on **Finish**.

A runnable prototype of a Vaadin portlet has been created in this **FirstVaadin** project. Expanding the `FirstVaadin/WebContent/WEB-INF` directory, you will find the following files:

- `liferay-display.xml`
- `liferay-plugin-package.properties`
- `liferay-portlet.xml`
- `portlet.xml`

These are Liferay portlet configuration files that you are familiar with. The Vaadin **Eclipse** plugin has automatically generated these files based on the **Generic portlet (Portlet 2.0)** deployment configuration.

Let us have a look at the contents of the `portlet.xml` file:

```
<portlet>
  <portlet-name>Firstvaadin Application portlet</portlet-name>
  <display-name>FirstVaadin</display-name>
  <portlet-class>com.vaadin.terminal.gwt.server.ApplicationPortlet2</
portlet-class>
  <init-param>
    <name>application</name>
    <value>com.example.firstvaadin.FirstvaadinApplication</value>
  </init-param>
  // ignore details
</portlet>
```

You may have noticed two things:

- The `init-param` does not introduce a JSP file for the portlet-class. This means that the user interface is implemented by the `com.example.firstvaadin.FirstvaadinApplication` Java class.
- That `com.example.firstvaadin.FirstvaadinApplication` class may be used as a servlet, which is a standalone web application.

In this section, we are only concerned with a Vaadin project as a portlet.

Deploying a Vaadin project as a portlet

We now deploy the Vaadin portlet.

1. Start Tomcat 6.0.x with Liferay 6.0, if it is not running.
2. Highlight **FirstVaadin** in **Eclipse** and right-click on it. Click on **Export | WAR file**.
3. For **Destination**, click on **Browse** and select **liferay-portal-6.0.x/deploy/**. Click on **Finish**.

When you see the **1 portlet for FirstVaadin is available for use message** in the log file, the **FirstVaadin** portlet has been deployed successfully. Log in as the Portal Administrator. Find the **FirstVaadin** portlet in the **Vaadin** category. Add the **FirstVaadin** portlet onto a page. Here is how it looks:

Integrating Vaadin portlet and Liferay environment

How can we access Liferay database in a Vaadin portlet? Who is the logged in user? Can we generate an action URL? To answer these questions, we need to integrate the Vaadin portlet and the Liferay environment.

Let us update the above-mentioned Vaadin portlet as follows:

1. Uncomment the following two lines in the `FirstVaadin/WebContent/WEB-INF/portlet.xml` file:

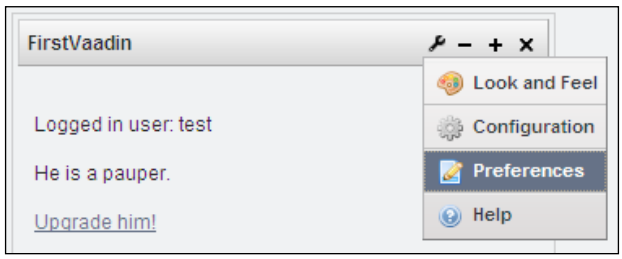
```
<!-- <portlet-mode>edit</portlet-mode> -->
<!-- <portlet-mode>help</portlet-mode> -->
```

2. Update `com.example.firstvaadin.FirstvaadinApplication` class in the `FirstVaadin/src/` folder as follows:

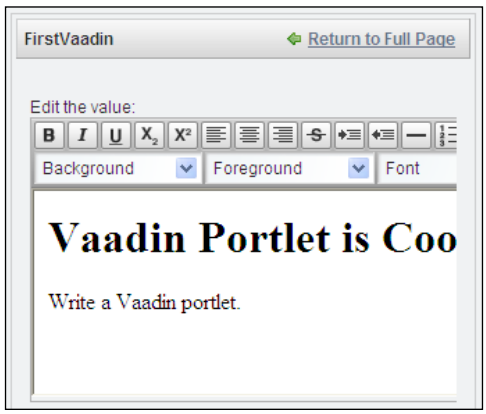
```
public void init() {
  mainWindow = new Window("Vaadin Portlet Application");
  setMainWindow(mainWindow);
  //ignore details
}
```

```
public void handleActionRequest(ActionRequest request,
  ActionResponse response, Window window) {
  response.setRenderParameter("action", "edit");
}
public void handleRenderRequest(RenderRequest request,
  RenderResponse response, Window window) {
  String loggedInUserIdStr = request.getRemoteUser();
  //ignore details
  window.setContent(viewContent);
}
public void handleResourceRequest(ResourceRequest request,
  ResourceResponse response, Window window) {
  if (request.getPortletMode() == PortletMode.EDIT)
    window.setContent(editContent);
  //ignore details
}
```

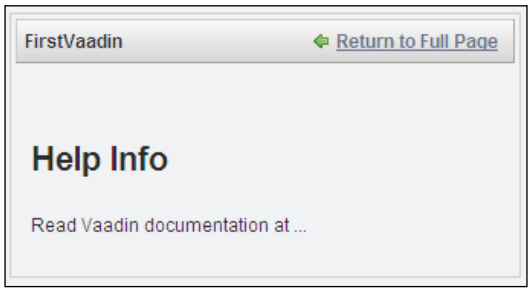
The `edit` and `help` mode configuration works together with the `handleResourceRequest` method in the `com.example.firstvaadin.FirstvaadinApplication` class. Now when you click on the wrench-shaped configuration icon, you will see the following screen:



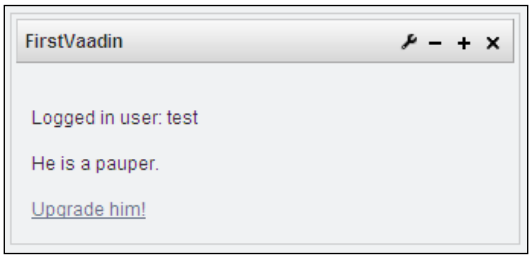
When you click on the **Preferences** link, the UI for the `edit` mode will open:



When you click on the **Help** link, the UI for the `help` mode will open:



Because the Vaadin portlet is running in the Portlet 2.0 context, the `handleRenderRequest` method of the `com.example.firstvaadin.FirstvaadinApplication` class will run every time the page is loaded, if the request is not a resource URL request. In this `handleRenderRequest` method, the code checks if the the user has logged in or not. If the user has logged in, the code will go to the Liferay database, get the user's screen name and display it. In the following screenshot, the default content is displayed:



In the above screenshot, an action URL is defined for the **Upgrade him!** link. After you click on the **Upgrade him!** link, the `handleActionRequest` method will run (You can update database and perform other actions in the `handleActionRequest` method). After that the `handleRenderRequest` method will run. The `handleRenderRequest` method will check if the `handleActionRequest` method has run. If the `handleActionRequest` has run, the `handleRenderRequest` will display the corresponding content, as follows:

You can see that he has changed from a **pauper** to a **prince**. It is amazing!

In the above update of the Vaadin portlet, we have achieved the following goals:

- Display intended content
- Access database
- Show the logged-in user
- Use render method
- Generate an action URL
- Call action method
- Change content in UI

What's happening?

As Liferay portal contains Vaadin's widget set, themes, JAR file and all required configuration in `portal.properties` as follows, the above features are basically sufficient for coding UI in a Vaadin portlet.

```
vaadin.resources.path=/html
vaadin.theme=reindeer
vaadin.widgetset=com.vaadin.portal.gwt.PortalDefaultWidgetSet
```

As shown in the above code, the portal first specifies the location of the portal-wide Vaadin themes and widget set (that is, client side JavaScript). Then it specifies the base Vaadin theme to load automatically for all Vaadin portlets. A portlet can also include an additional theme that is loaded after the shared theme. Finally it specifies the shared widget set that is used by all Vaadin portlets running in the portal.

Common Liferay tags in portlets

We often see date input fields, a back button, exception messages, and paginated tables on Liferay portal pages. They have become patterns. As they are frequently used, Liferay has grouped them into custom tags. These tags are concise and practical. If we are familiar with them, they will save us time in coding the portlet user interface.

Liferay portal tags are JavaServer Pages Standard Tag Library (JSTL) tags. Using Liferay tags has the following two benefits.

- You get a complicated feature with only one tag.
- Liferay UI tags have been tested. They do not introduce bugs. This saves testing time.

Liferay has defined or extended many portlet UI tags. In this chapter, we will talk about seven kinds of frequently used ones:

- Alloy (AUI) tags
- Liferay portlet tags
- Liferay liferay-portlet tags
- Liferay security tags
- Liferay theme tags
- Liferay UI tags
- Liferay utility tags

In your JSP file, remember to include the following lines for your Liferay tag references:

```
<%@ taglib uri="http://liferay.com/tld/aui" prefix="aui" %>
<%@ taglib uri="http://liferay.com/tld/portlet" prefix="liferay-
portlet" %>
<%@ taglib uri="http://liferay.com/tld/security" prefix="liferay-
security" %>
<%@ taglib uri="http://liferay.com/tld/theme" prefix="liferay-theme"
%>
<%@ taglib uri="http://liferay.com/tld/ui" prefix="liferay-ui" %>
<%@ taglib uri="http://liferay.com/tld/util" prefix="liferay-util" %>
```

Also, remember to include the `$PLUGINS_SDK_HOME/portlets/uisix-portlet/docroot/WEB-INF/lib/util-taglib.jar` file in your custom portlet package. Eventually the Java classes in this jar file will interpret the tags and generate HTML markup for your page.

AUI tags

These are Alloy UI tags, which are newly introduced in Liferay portal. They will be illustrated in detail in *Chapter 8*.

Liferay portlet tags

Liferay portlet tags define the basic functionalities of a portlet.

portlet:defineObjects

The `portlet:defineObject`**s** tag may be the first tag that you use in portlet development in Liferay. However, you may have overlooked it.

```
<portlet:defineObjects />
```

A `com.liferay.taglib.portlet.DefineObjectsTag` class is responsible for its interpretation. The result is that the following objects, among others, are set in the `pageContext`:

- `renderRequest`
- `renderResponse`
- `portletPreferences`

In this way we can directly use these objects in our portlet JSP file coding. This tag does not generate HTML markup. However, we must know this tag.

portlet:actionURL

The `portlet:actionURL` tag is one of the most frequently used Liferay portlet tags. We can use the `actionURL` tag to dynamically generate a URL in our JSP file and use it, say, as an action URL for a form. To achieve this, we can use this portlet tag as follows:

```
<portlet:actionURL var="editArticleActionURL">
   <portlet:param name="struts_action" value="/journal/edit_article"
/>
</portlet:actionURL>
```

This tag is interpreted by the `com.liferay.taglib.portlet.ActionURLTag` class. It generates an action URL string with page layout ID, portlet ID, portlet mode, window state, and layout information. It will also include a parameter name of `struts_action` with a value of `/journal/edit_article`. This URL is set as value for an `editArticleActionURL` variable. Eventually this variable is used as the action URL for a form as follows:

```
<aui:form action="<%= editArticleActionURL %>" enctype="multipart/
form-data" method="post" name="fm1">
```

Its final HTML markup is like this:

```
<form action="http://localhost:8080/group/control_panel/
manage?p_auth=78ywGpl1&amp;p_p_id=15&amp;p_p_lifecycle=1&amp;p_p_
state=maximized&amp;p_p_mode=view&amp;doAsGroupId=10147&amp;refererPl
id=10503&amp;_15_struts_action=%2Fjournal%2Fedit_article" class="aui-
form " id="_15_fm1" name="_15_fm1" enctype="multipart/form-data"
method="post" >
```

As you can see, the above tag snippets are taken from the **Edit Web Content** page in the **Control Panel**.

portlet:param

The `portlet:param` tag is a very useful Liferay portlet tag. Here is an example `portlet:param` tag:

```
<portlet:param name="struts_action" value="/journal/edit_article" />
```

This tag is interpreted by the `com.liferay.taglib.util.ParamTag` class. It adds the portlet ID as prefix to the parameter name, sets the value of the parameter, and appends the parameter-value pair to a dynamically-generated URL. As you can see, this `portlet:param` tag example is taken from the above mentioned action URL tag. This tag will append the parameter-value pair to the action URL. The `portlet:param` tag is used within an action URL tag, render URL tag or a resource URL tag.

When you request a portal page with a URL, you usually want to pass some information along with the URL to the application server, telling the application server what to do. So you will use this `portlet:param` tag often.

portlet:renderURL

The `portlet:renderURL` tag will generate a render URL string, which can be used to invoke the `render` method of the portlet Java class. An example render URL tag is as follows:

```
<portlet:renderURL var="editArticleRenderURL" windowState="<%=
WindowState.MAXIMIZED.toString() %>">
  <portlet:param name="struts_action" value="/journal/edit_article" />
</portlet:renderURL>
```

This render URL tag is interpreted by the `com.liferay.taglib.portlet.RenderURLTag` class.

portlet:resourceURL

The `portlet:resourceURL` tag generates a resource URL string. A resource URL is different from an action URL and a render URL in that a resource URL returns content without theme or layout markup. It is used to create text, HTML markup or binary files. Here is an example resource URL tag:

```
<portlet:resourceURL>
  <portlet:param name="reportType" value="pdf" />
</portlet:resourceURL>
```

The resource URL tag is interpreted by the `com.liferay.taglib.portlet.ResourceURLTag` class.

Liferay liferay-portlet tags

These are Liferay portlet tag extensions. They are very similar to the above-mentioned portlet tags but with additional features.

liferay-portlet:actionURL

The `liferay-portlet:actionURL` tag is similar to the `portlet:actionURL` tag. It is an extension to the `portlet:actionURL` tag—it has additional attributes:

- `varImpl`: When you set a value to this attribute, the `liferay-portlet:actionURL` tag will generate a `PortletURL` object instead of an action URL string
- `plid`: This means page layout ID. You can set its value to the ID of another page. In this way, when this URL is invoked, the browser will display another page
- `portletName`: You can set its value to the name of another portlet. In this way the URL will invoke another portlet instead of the current portlet
- `anchor`: Set its value to false if you do not want the page to reload and anchor to the current portlet
- `encrypt`: Set its value to true if you want to encrypt the parameter values
- `doAsUserId`: If you want the current user to impersonate another user when this URL is fired, set its value to the ID of the another user
- `portletConfiguration`: Set its value to true if you want to pass the parameter values needed when the user is accessing a portlet that is wrapped by the Portlet Configuration portlet

This tag is also interpreted by the `com.liferay.taglib.portlet.ActionURLTag` class, like the `portlet:actionURL` tag. A `liferay-portlet:actionURL` tag example follows:

```
<liferay-portlet:actionURL var="publicPagesURL" portletName="<%=
PortletKeys.MY_PLACES %>">
  <portlet:param name="struts_action" value="/my_places/view" />
  // ignore details
</liferay-portlet:actionURL>
```

liferay-portlet:renderURL

The `liferay-portlet:renderURL` tag is also an extension to the `portlet:renderURL` tag. It is similar to the `portlet:renderURL` tag but with the following additional attributes:

- `varImpl`
- `plid`
- `portletName`
- `anchor`
- `encrypt`
- `doAsUserId`
- `portletConfiguration`

You can use the above attributes as you do in the `liferay-portlet:actionURL` tag. The `liferay-portlet:renderURL` is also interpreted by the `com.liferay.taglib.portlet.RenderURLTag` class, like the `portlet:renderURL` tag.

liferay-portlet:resourceURL

The `liferay-portlet:resourceURL` tag is an extension to the `portlet:resourceURL` tag. It has the following additional attributes:

- `varImpl`
- `plid`
- `portletName`
- `anchor`
- `encrypt`
- `doAsUserId`
- `portletConfiguration`

You can use the above attributes as you do in the `liferay-portlet:actionURL` tag. The `liferay-portlet:resourceURL` tag is also interpreted by the `com.liferay.taglib.portlet.ResourceURLTag` class, like the `portlet:resourceURL` tag.

Liferay security tags

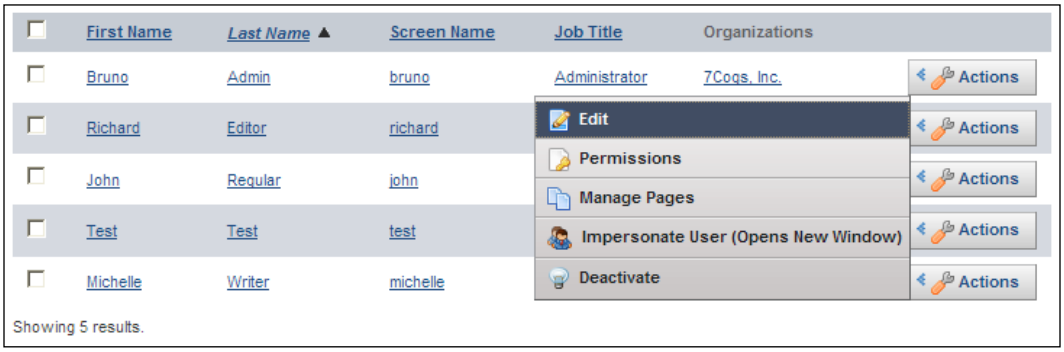
The Liferay security tags are an inseparable part of Liferay's authentication and authorization functionalities.

liferay-security:doAsURL

The first Liferay security tag is the `liferay-security:doAsURL` tag. An example follows:

```
<liferay-security:doAsURL
  doAsUserId="<%= userId %>"
  var="impersonateUserURL"
/>
```

This tag is interpreted by the `com.liferay.taglib.security.DoAsURLTag` class. It will generate a URL for impersonating another user and put the URL value in the `pageContext`. That URL will eventually be used in the **Impersonate User (Open New Window)** link as shown in the following screenshot:



liferay-security:permissionsURL

Liferay's `liferay-security:permissionsURL` tag presents the permission interface to the user. It allows a user to set permissions on a resource. This resource can be a portlet, a model, or a page. The following permissions URL tag returns a URL that takes the user to a page where he can configure the permission settings.

```
<liferay-security:permissionsURL
    modelResource="<%= Layout.class.getName() %>"
    modelResourceDescription="<%= selLayout.getName(locale) %>"
    resourcePrimKey="<%= String.valueOf(selLayout.getPlid()) %>"
    var="permissionURL"
/>
```

The value for the `modelResource` attribute is the fully qualified Java class name. This name will be translated through the `Language.properties` file to a more user-friendly name.

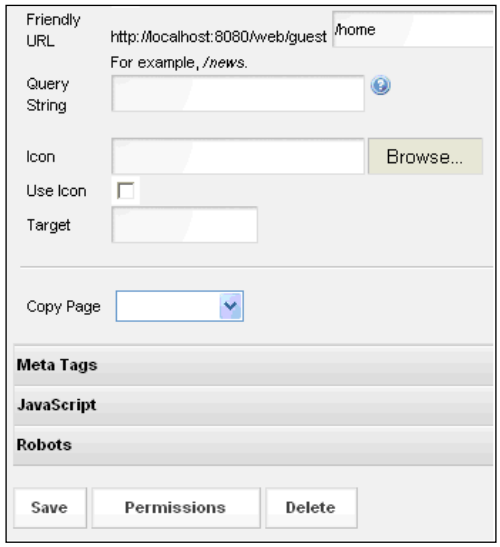
The value for the `modelResourceDescription` can be anything. Here it gets the page name by locale. The `resourcePrimKey` gets the value of the page layout ID.

This tag is interpreted by the `com.liferay.taglib.security.PermissionsURLTag` class. If the `var` attribute value is not null, it generates a permissions URL and set it as a `pageContext` attribute with the `var` value as name. If the `var` attribute value is null, it just print out the permissions URL as HTML mark up.

The above tag is taken from the `$AS_ROOT_HOME/html/portlet/communities/edit_pages_page.jsp` file. The `permissionsURL` is generated for a **Permissions** button on the page, as follows:

```
<input type="button" value="<liferay-ui:message key="permissions" />"
onClick="location.href = '<%= permissionURL %>';" />
```

In the following screenshot, you can see that this is for the first default page of the **Guest** community. The page name is **Welcome**.



When you click on the **Permissions** button, you will see a page where you can configure the permissions for the **web/guest/home** page.

Liferay theme tags

The Liferay theme tags are important in the portlet UI coding.

liferay-theme:defineObjects

This is an important Liferay theme tag that we often use.

```
<liferay-theme:defineObjects />
```

It is interpreted by the `com.liferay.taglib.theme.DefineObjectsTag` class. What does this tag do? It puts `themeDisplay`, `company`, `user`, `scopeGroupId`, and other frequently used objects into the `pageContext` so that we can directly use them in our portlet JSP files—it is important for us to know how to use this tag.

liferay-theme:include

The `liferay-theme:include` tag includes a JSP file in a portal page. An example is as follows:

```
<liferay-theme:include page="portal_normal.jsp" />
```

This `liferay-theme:include` tag is interpreted by the `com.liferay.taglib.theme.IncludeTag` class.

liferay-theme:layout-icon

The next theme tag is the `liferay-theme:layout-icon` tag, which may have been used only once in the Liferay Portal. It is as follows:

```
<liferay-theme:layout-icon layout="<%= selLayout %>" />
```

The `liferay-theme:layout-icon` tag is interpreted by the `com.liferay.taglib.theme.LayoutIconTag` class. It sets the layout attribute and its value in the HTTP servlet request object.

liferay-theme:meta-tags

The `liferay-theme:meta-tags` theme tag, as follows, may have been used only once in Liferay Portal.

```
<liferay-theme:meta-tags />
```

The `liferay-theme:meta-tags` tag is interpreted by the `com.liferay.taglib.theme.MetaTagsTag` class. It includes the meta tag markup in every portal page. The following is an example line:

```
<meta content="text/html; charset=UTF-8" http-equiv="content-type" />
```

liferay-theme:wrap-portlet

Another theme tag is the `liferay-theme:wrap-portlet` tag, as follows:

```
<liferay-theme:wrap-portlet page="portlet.jsp">
   <div class="portlet-content-container" <%= containerStyles %>>
         <%@ include file="/html/common/themes/portlet_content_
wrapper.jspf" %>
   </div>
</liferay-theme:wrap-portlet>
```

The `page` attribute is a required attribute for this tag. This tag uses the `com.liferay.taglib.theme.WrapPortletTag` class for interpretation. It will generate content including the portlet chrome and the portlet content—it is an important tag to know.

Liferay UI tags

Most of Liferay tags are UI tags. They are used for a lot of purposes. The Liferay UI tags are explained in detail in *Chapter 9*.

Liferay utility tags

The Liferay utility tags are for general purposes.

liferay-util:buffer

Liferay utility has a `liferay-util:buffer` tag. An example follows:

```
<liferay-util:buffer var="removeGroupIcon">
  <liferay-ui:icon
    image="unlink"
    label="<%= true %>"
    message="remove"
  />
</liferay-util:buffer>
```

This `liferay-util:buffer` tag is interpreted by the `com.liferay.taglib.util.BufferTag` class. It sets an attribute-value pair in the `pageContext`. In the above example, the attribute name is `removeGroupIcon`; the attribute value is the content returned by the `liferay-ui:icon` tag.

liferay-util:html-top

The next Liferay utility tag is the `liferay-util:html-top` tag.

```
<liferay-util:html-top>
  <link href="<%= HtmlUtil.escape(rssURL) %>" rel="alternate"
title="RSS" type="application/rss+xml" />
</liferay-util:html-top>
```

This `liferay-util:html-top` tag is interpreted by the `com.liferay.taglib.util.HtmlTopTag` class. It adds the content in between the `liferay-util:html-top` tags in the body part of a portal page.

liferay-util:include

There is also a `liferay-util:include` tag:

```
<liferay-util:include page="/html/portal/portlet_inactive.jsp" />
```

It is usually used to include a JSP file. This line comes from `$AS_ROOT_HOME/html/common/themes/portlet_content_wrapper.jspf`, which is used to show the content of the portlet concerned or a message depending on, say, whether the viewer has permission to access the portlet.

liferay-util:param

The last Liferay utility tag is the `liferay-util:param` tag.

```
<liferay-util:include page="/html/portlet/communities/toolbar.jsp">
  <liferay-util:param name="toolbarItem" value='<%= (group == null) ?
"add" : "view-all" %>' />
</liferay-util:include>
```

This `liferay-util:param` tag is interpreted by the `com.liferay.taglib.util.ParamTag` class. It adds a parameter-value pair in the request object for use by the JSP file in the enclosing tag. In the above example, the JSP file is the `$AS_ROOT_HOME/html/portlet/communities/toolbar.jsp` file.

UI customization through hooks in Plugins SDK

In the `$PLUGINS_SDK_HOME` folder there is a `hooks` directory. We can create a **hook** there to change Liferay's out-of-the-box JSP files, thus updating the UI.

A hook application is like a portlet application. The story behind the hook is like this: Previously developers could write their own code to update Liferay's core features in its extension environment. This incurs difficulties when Liferay is upgraded to a new version—you have to check which file has been changed and how you can put in your update code. To facilitate customization along Liferay upgrade, the Liferay people introduced the hook feature. Now you can modify Liferay UI with a JSP file in a hook application. When you deploy the hook application, like you deploy a portlet application, the targeted JSP page will be replaced. When you remove the hook application, the original UI will be restored. A hook is like a television remote. Before remotes were invented, one had to personally approach the television set and press buttons. Now, with hook you can remain a couch potato from the beginning of the show to the end.

A hook application allows a developer to hook into Liferay's eventing system, model listeners, JSPs, and portal properties. We talk about JSP hooks in this section. Here is a hook configuration file:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hook PUBLIC "-//Liferay//DTD Hook 6.0.0//EN" "http://www.
liferay.com/dtd/liferay-hook_6_0_0.dtd">
<hook>
    <custom-jsp-dir>/WEB-INF/ui/jsps</custom-jsp-dir>
</hook>
```

It specifies a custom JSP file folder. After this hook application is deployed, Liferay will come to this folder to look for JSP files. If it finds in it such a JSP file like `html/portlet/my_account/view.jsp`, Liferay will use it to replace the `$AS_ROOT_HOME/html/portlet/my_account/view.jsp` file, generating HTML markup and presenting it to the user.

Now you **do not** touch Liferay's core code. You use hook to update it.

This works for all JSP files in the portal, portlets, servlets, and tags. All you need to do is follow the same folder structure as the targeted JSP file.

You can build, package, and deploy hooks as you do other Plugin SDK applications.

Following Liferay UI coding conventions

One way of content generation is to copy, paste, and update. Liferay portal is a mature web application framework. When you are developing a custom portlet, you can almost always copy some code snippets from the existing portlets—this saves time.

When you copy Liferay's code, you are unconsciously following Liferay's coding convention, which is a good practice: Follow the coding style of the existing Liferay code.

Here are some UI coding conventions that we can follow on a Liferay portal project.

- For directly called JSP files, use the `.jsp` extension; for JSP files included in JSP files, use the `.jspf` extension. Here is an example:

```
<%@ include file="/html/portlet/journal/article_search_results.
jspf" %>
```

- Use single quotes for strings in JavaScript, like this:

```
confirm('<%= UnicodeLanguageUtil.get(pageContext, "are-you-sure-
you-want-to-delete-the-selected-feeds") %>')
```

- Use a fieldset to group related input fields. An example follows:

```
<form action="..." method="post">
 <fieldset class="orchardClass">
   <legend>Orchard Fruits</legend>
      <label for="<portlet:namespace />apple">Apple</label>
      <input name="<portlet:namespace />apple" type="text"
value="1" />
      <label for="<portlet:namespace />orange">Orange</label>
      <input name="<portlet:namespace />orange" type="text"
value="2" />
      <input type="submit" value="<liferay-ui:message key="pick"
/>" />
 </fieldset>
</form>
```

- Use an existing Liferay separator to distinguish page sections of different categories, like this:

```
<div class="separator"><!-- --></div>
```

If you follow these coding conventions, the UI that you create will be more consistent with the existing Liferay portal UI.

Source code

A `uisix-portlet-6.0.5.1.war` file is attached to this chapter. It contains source code for the `uisix` portlet.

A `FirstVaadin.zip` file is also attached to this chapter. It is for the development of a Vaadin portlet in Liferay portal.

Summary

In this chapter, we have learned portlet-related UI in Liferay. Now we have the following knowledge:

- Liferay supports multiple portlet technologies
- Portlet chrome can be customized through a theme
- **AJAX** and a resource URL can be used to change page content without refreshing a portal page
- PDF and EXCEL reports can be generated as a portlet UI
- Liferay now fully supports Vaadin
- The portal has seven frequently used portlet UI tag types, which are useful in the portlet development
- Hooks are used to customize the portlet UI
- It is good practice to follow existing UI coding conventions

In the next chapter, we will look at another aspect of the Liferay user interface—Velocity templates.

7
Velocity Templates

Liferay uses Velocity templates to accumulate theme components. In *Chapter 2*, *Basic Theme Development*, we talked about Velocity templates for themes. In this chapter, we study this topic more extensively. Particularly, we will talk about the following aspects of Velocity templates:

- Velocity template language
- Velocity template
- Velocimacro
- Velocity portlet
- Five basic Velocity templates for a theme
- Velocity templates and site performance
- Theme customization through Velocity templates
- Velocity template for Web Content portlet
- FreeMarker template

We will start with some basic concepts. After that, we will try to create our own themes.

Before we start

Velocity templates are used in three places in Liferay portal:

- Theme
- Page layout
- Web content

We talked about layout templates in detail in *Chapter 3*, *Layout Templates*. In this chapter, we look into the Velocity templates in themes. We will also talk about web content templates briefly at the end of this chapter.

What is Velocity?

Velocity is an open source templating technology developed by programmers all over the world. It is a project of the Apache Software Foundation. Velocity uses its Java-based template engine to merge templates.

We can reference objects defined in Java code with the Velocity template language. A Velocity template thus can be used for user interface in web applications. As a result, Velocity helps achieve the separation of the presentation layer and the business logic implementation. It provides an alternative to **JavaServer Page** (**JSP**) and **Hypertext Preprocessor** (**PHP**).

Velocity can also be used to generate source code, format emails and transform XML files.

Velocity template language

Let us briefly review the syntax of the **Velocity Template Language** (**VTL**).

Statements and references

Here is a VTL statement:

```
#set ($me = "Velocity")
```

A VTL statement begins with a `#` sign. The word `set` is a directive. In VTL, a reference begins with a `$` character. So `$me` is a reference, a variable reference in this case. The `$me` variable is assigned the value of `Velocity`. `Velocity` is a string. In VTL a string can be enclosed in single or double quotes. A string in single quotes will be interpreted literally while a string in double quotes can contain variables that will be substituted with their values when the template is merged.

There is another way of using references:

```
$witness.getMessage()
```

Here we use a reference to call the method of an object, which has been defined in Java code and added in the Velocity context. The template engine will print out a message returned by the `getMessage()` method of the bean `witness`.

Conditional statements

Any scripting language has conditional statements because that logic has been built in the central processing unit (CPU).

```
#if( $ihave > 199 )
    <b>Buy iPhone</b>
#elseif( $ihave == 199 )
    <b>Buy Nexus One</b>
#else
    <b>Play volleyball</b>
#end
```

The `if` directive ends with an `end` directive. You can see that, no matter what I have, I can always have fun.

Loops

There is also a loop directive in VTL.

```
<ul>
#foreach( $energy in $cleanEnergies )
      <li>$energy</li>
#end
</ul>
```

This directive may print out the following:

- Solar energy
- Wind power
- Hyropower
- Geothermal energy

Directives

Here are some common directives in VTL.

The `include` directive allows the template writer to import a local file. The contents of this local file will be added in the template at the location where the `include` directive is defined. The contents of the file will not be interpreted by the template engine:

```
#include( "snippet.html" )
```

There is also a `parse` directive. This directive will take a template file as argument. The template engine will parse this template file and render its content. Here is the command:

```
#parse ("navigation.vm")
```

This will render the `navigation.vm` template.

The `stop` directive stops the running of the template engine. It can be used for debugging purposes:

```
#stop
```

Velocimacros

Velocity templates in Liferay also use Velocity macros called **Velocimacros**. A Velocimacro is a small function in the VTL. It can be used to process strings. It takes parameters as input and print out text. It does not return values. A template developer can use the `macro` directive to write a Velocimacro, which may be used more than once in a Velocity template.

```
#macro (printSwimmingPools $val)
  #if ($val )
    #foreach ($e in $val)
      <tr><td bgcolor="#0000FF">$e</td></tr>
    #end
  #end
#end
```

Here is how we can use this **Velocimacro** in a template.

```
#set( $nemoSwimmingPools = ["The Pacific Ocean","The Atlantic
Ocean","The Indian Ocean"] )
<table>
    #printSwimmingPools( $nemoSwimmingPools )
</table>
```

Usually Velocimacros are defined in a file called `VM_global_library.vm`. This is the case in Liferay. At the same time, Liferay uses its own `${PORTAL_SRC_HOME}/portal-impl/src/VM_liferay.vm` for its custom Velocimacros. In Liferay, the Velocity-related properties are set in the `${PORTAL_SRC_HOME}/portal-impl/src/portal.properties` file (After compilation, this `portal.properties` file will be in the `${AS_ROOT_HOME}/WEB-INF/lib/portal-impl.jar` file):

```
velocity.engine.velocimacro.library=VM_global_library.vm,VM_liferay.vm
```

Comments

There is another thing that we should know about VTL—how to add comment lines.

```
## single line comment.
#*
 multi-line
 comment.
*#
```

These lines in a Velocity template will be skipped by the Velocity engine and will not be output to a portal page. Users will not see them.

For more information about VTL, you can refer to **Velocity User Guide** at `http://velocity.apache.org/`.

What is a Velocity template?

Let us first see an example of a Velocity template:

```
<html>
  <head>
    <title>A Template Based Page</title>
  </head>
  <body>
    <p>I am $me.</p>
    <p>I am $merit.</p>
  </body>
</html>
```

This Velocity template is in HTML. It is markup for a complete web page.

So, a Velocity template is a text file that consists of:

- Static text
- Velocity references as placeholders
- Velocity directives and instructions

A Velocity template can be used in HTML, XML, SQL and other formats.

Velocity portlet

We now write a **Java Portlet Specification 2.0** (**JSR 286**) compliant Velocity portlet in Liferay Plugins SDK.

1. Run `create.bat velocity Velocity` in `${PLUGINS_SDK_HOME}/portlets/`. This will create a `velocity-portlet/` folder
2. In the `${PLUGINS_SDK_HOME}/portlets/velocity-portlet/docroot/WEB-INF/src/` folder, create a `com.sample.jsp.portlet.VelocityPortlet.java` file. Its main content is as follows:

```
public void doView( … ) throws PortletException {
  // ignore details
  Template template = getTemplate(_viewTemplate);
  mergeTemplate(template, renderRequest, renderResponse);
  // ignore details
}
// ignore details
protected Template getTemplate(String name) throws Exception {
  Properties p = new Properties();
  p.setProperty( "resource.loader", "class" );
  // ignore details
  Velocity.init(p);
  Template template = Velocity.getTemplate( name );
  return template;
}
```

3. Create a `${PLUGINS_SDK_HOME}/portlets/velocity-portlet/docroot/WEB-INF/src/view.vm` file with the following content:

```
#set ($me = "Velocity")
#set ($merit = "fast")
<p>I am $me.</p>
<p>I am $merit.</p>
```

4. Modify the `${PLUGINS_SDK_HOME}/portlets/velocity-portlet/docroot/WEB-INF/portlet.xml` file as follows:

```
<portlet-class>com.sample.jsp.portlet.VelocityPortlet</portlet-class>
<init-param>
   <name>view-template</name>
   <value>view.vm</value>
</init-param>
```

The `${PLUGINS_SDK_HOME}/portlets/velocity-portlet/docroot/WEB-INF/src/view.vm` file is a Velocity template. It initializes two references. These two references are then used in two paragraphs.

The `com.sample.jsp.portlet.VelocityPortlet` class reads the `${PLUGINS_SDK_HOME}/portlets/velocity-portlet/docroot/WEB-INF/src/view.vm` template and generates an `org.apache.velocity.Template` object. This object is passed to the `mergeTemplate` method, which interprets and renders (or merges) the template.

Now, deploy this porlet and add it to a page. You will get this:

Congratulations! You have successfully created a Velocity portlet in Liferay. You can start from this portlet and create fancier ones for yourself.

Why is Velocity for Liferay?

Velocity is the default engine for templates in Liferay. Why is this so?

Hot-deployable themes are themes that you deploy at runtime. The themes that you deploy from **Eclipse** in Plugins SDK are hot-deployable themes. These themes are deployed as a Web Application Archive (WAR) file, such as `store-theme-${VERSION}.war`, which has a `.war` extension. Such themes must use Velocity templates because they cannot access Liferay's classes.

Liferay placed its Java Archive (JAR) files in the shared class loader until Version 4.0.0. The intention was to allow all the applications in Liferay to use Liferay's classes because they were in the shared class directory. At that time, both JSP and Velocity templates were supported for themes since those JSP template files can access Liferay's classes in the shared class loader. However, putting Liferay's classes in the shared class loader presented an inconvenience as those classes would override classes in other applications, including custom portlet applications by a client. For example, Liferay might use `ehcache-2.1.5.jar` while a client's portlet application was written with `ehcache-2.0.0.jar`. This would cause conflicts.

So, since Liferay Portal 4.0.0 final, no JAR files have been placed in the shared class loader. This allows Liferay core applications to use different versions of Hibernate, Struts, and other **Application Programming Interfaces** (**API**) from those used by a client. Now a client's portlet application can be deployed and run in Liferay without any change of code. However, this also means that the hot-deployed themes can no longer access Liferay's classes because they are not in the shared class loader any more.

Liferay has converted all of its community themes to use Velocity. We can study these themes to learn how to build our own themes with Velocity. We can read the `com.liferay.portal.velocity.VelocityVariables` class for all the Velocity variables that are available for our use in templates.

Re-building Classic theme in Plugins SDK

What is the role that a Velocity template places in a Liferay theme? To answer this question, we first create a theme.

We start with Liferay's Classic theme. The Classic theme is written in Liferay's core environment. We will re-generate this theme in the Plugins SDK. It is worthwhile to do this because we can then base our custom themes on this newly-generated theme.

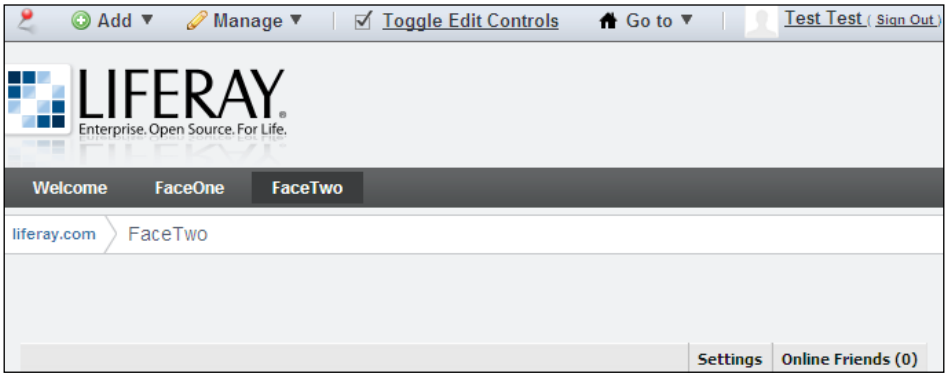
1. In the `${PLUGINS_SDK_HOME}/themes/` directory, run the following:

   ```
   create.bat store Store
   ```

   This will create a `store-theme/` directory, which is for the `Store` theme
2. Find the `css/`, `images/`, `js/`, and `templates/` directories in the `${AS_ROOT_HOME}/html/themes/classic/` folder. The four directories contain the files for the Classic theme. The `templates/` directory contains all the Velocity templates for the Classic theme.
3. Copy the `css/`, `images/`, `js/` and `templates/` directories to the `${PLUGINS_SDK_HOME}/themes/store-theme/docroot/_diffs/` directory. Or, you may modify the `${PLUGINS_SDK_HOME}/themes/store-theme/build.xml` file as follows to achieve the same purpose:

   ```
   <property name="theme.parent" value="classic" />
   ```
4. Ant-deploy the Store theme.

When you see the **1 theme for store-theme is available for use** message in the log file, it means that the Store theme has been deployed successfully. Apply this theme to a page. Here is the screenshot:



Congratulations! You have successfully moved the Classic theme to the Plugins SDK. Now you can update this theme to create your own theme.

Open the `${PLUGINS_SDK_HOME}/themes/store-theme/docroot/_diffs/templates/` directory and find the following files in it:

- `init_custom.vm`
- `navigation.vm`
- `portal_normal.vm`
- `portal_pop_up.vm`
- `portlet.vm`
- `init.ftl`
- `init_custom.ftl`
- `navigation.ftl`
- `portal_normal.ftl`
- `portal_pop_up.ftl`
- `portlet.ftl`

The five files with `.vm` extension are Velocity templates while the six files with `.ftl` extension are FreeMarker templates. We will study the five Velocity templates in the following sections.

Velocity templates in a Liferay theme

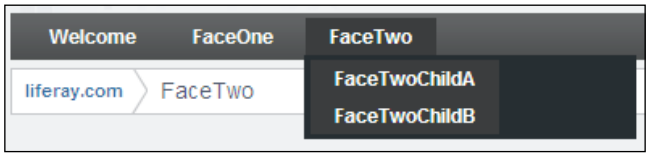
Previously there was also an `init.vm` template besides the above-mentioned five templates in a custom theme. The `init.vm` template was responsible for initializing some Velocity variables to be used in the other five templates. Now the Velocity variables have been initialized and placed in the Velocity context in the com.liferay.portal.velocity.VelocityVariables class. However, you can still find the `init.vm` template in the `${AS_ROOT_HOME}/html/themes/_unstyled/templates/` directory for the Classic theme.

init_custom.vm

You can initialize custom Velocity variables in this template. You can also set values to the existing variables to override their existing values. The variables defined here can be referenced in the other four templates.

navigation.vm

This template defines the horizontal page navigation bar. When a page name is highlighted, its child page names also show up. Refer to the following screenshot:



When you click on a page name, the browser will display that page.

This template is called by the `portal_normal.vm` template.

portal_normal.vm

The `portal_normal.vm` template defines the whole portal page. It directly or indirectly calls all the other templates of the theme. Every time a portal page is requested, this template is called, interpreted and rendered.

This template controls which content is displayed and which is hidden. If you want to hide part of the page content, you come here to remove or comment out that part of the code.

portal_pop_up.vm

This is a simple version of the `portal_normal.vm` template. It also defines a complete page. The template is for a popup window. That is why it is simpler than the `portal_normal.vm` template.

portlet.vm

This template defines the HTML output for a portlet. It specifies the portlet template and wraps a portlet in it. Eventually it displays the portlet icon, portlet name, configuration icon, maximize icon, minimize icon, removal icon and the content output for the portlet.

When a user requests a page with a URL, the browser sends the request to the **Application Server** (**AS**). Liferay gets the page name from the URL. It goes to the `layout` database table and finds the related theme and page layout. Based on the page layout, Liferay finds the portlets added into each area of the page layout. Liferay runs the portlet and adds the output in the `portlet.vm` template. Liferay interprets the `portlet.vm` template and adds the output in the page layout. Then Liferay interprets the page layout and adds the output in the `portal_normal.vm` template. After that Liferay interprets the `portal_normal.vm` template and returns the output, which is HTML markup, to the browser. The browser renders the HTML markup and presents the portal page to the user.

Velocity templates and portal page performance

Because the `portal_normal.vm` template incorporates other Velocity templates and defines the whole portal page, the Velocity templates have direct impact on the site performance.

According to the Yahoo! research published at `http://developer.yahoo.com/performance/`, if it takes three seconds for a browser to load a portal page, the browser spends 20% of the time in getting the HTML markup from the AS. It spends 80% of the time in rendering the HTML markup, which includes downloading images, Cascading Style Sheets (CSS), and JavaScript files, based on their URLs. The more URL-based components there are in the HTML markup, the more time it will take for the browser to present the page to the end user.

What does this mean for our template writing? We know that a page request to the AS will cause the `portal_normal.vm` template to be called and interpreted. When the second request comes to the AS, if the previously requested page has not been cached or the second request is for a different page with the same theme, the same code in the Velocity templates will run again to generate the HTML markup. This may be a place where we can improve for performance. However, this process does not take up the majority of the response time of the site. The loading of the images, CSS, and JavaScript files embedded in the final HTML markup takes 80% of the response time.

This observation is significant in our template design and development. Here are some rules that we can follow while designing a theme and writing its Velocity templates:

- Reduce the number of HTTP requests, that is, embed fewer images, scripts, and stylesheets in the templates
- Put content, say, image files, on a separate server
- Put stylesheets in the top section of the HTML markup. This allows a progressive rendering of a page
- Put JavaScript code at the bottom of the portal page markup

In ten years of evolution, Liferay has taken measures to improve its portal performance:

- Use CSS sprites for images. The sprite combines all the images in a theme image folder. Then it uses the CSS `background-image` and `background-position` properties to specify the image to be displayed (See sample code that follows). In this way, only one request is needed for the sprite instead of multiple requests for all the images:

```
aui-icon {
  background-repeat: no-repeat;
  background: url(../images/icon_sprite.png) no-repeat 0 0;
  // ignore details
}
.aui-icon-carat-1-tr {
  background-position: -16px 0;
}
```

- Use a header filter. This filter has the following configuration. It tells the browser to cache image, JSP, HTML, CSS, and JavaScript files. In this way, the number of HTTP requests will be greatly reduced when a user visits the same page for the second time. See the following snippet of code:

```
<init-param>
  <param-name>Cache-Control</param-name>
  <param-value>max-age=315360000, public</param-value>
</init-param>
```

- Use a cache filter. After the `portal_normal.vm` template has been interpreted and the HTML document is ready, this filter saves the HTML document in cache. When the same URL comes to the AS the next time, the application returns the cached HTML document instead of running the `portal_normal.vm` template again.
- Use a strip filter. Before the final HTML document is delivered to the browser, this filter removes all the redundant white spaces in the HTML document. This reduces the bytes to be transferred over the network
- Use `GZipFilter`. This filter compresses the HTML document, image, CSS and JavaScript files before they are delivered to the browser. It reduces the bytes to be transferred.

These filters are defined in the `${AS_ROOT_HOME}/WEB-INF/web.xml` file.

What else can we try to improve the performance of a Liferay portal site? Consider the following ideas:

- Put JavaScript code after the `</html>` tag in the `portal_normal.vm` template. This is not orthodox. However, almost all the major browsers support it. This can improve performance because of the following reasons:
    - When the browser tries to run this part of the code the rendering of the page is already done. The end user has a lot of content to read at that moment.
    - When the browser is downloading JavaScript files referred to in that part of the code, no image or CSS file downloading is competing for the bandwidth.
    - That part of the JavaScript code does not affect a user's visual experience at that moment.
- Use the portlet event feature and the resource URL newly introduced in **JSR 286** together with AJAX to do incremental update of portlet content. How significant is this? This means that all the theme content on a portal page remain unchanged. When the user clicks on a button in a portlet on the page, a request goes to the AS and fetches only the updated content for that portlet – no Velocity templates will be called or interpreted. This dramatically improves site performance. Developers at `http://www.portletfaces.org/` have been writing ICEfaces portlets to achieve this goal. They already have sample portlets for demo. Liferay portal has already incorporated ICEfaces portlets

What we can do with Velocity templates

We can add a new template so that it can be called by the `portal_normal.vm` file. We can also update an existing template.

Adding a Velocity template

Each template takes care of certain content in a theme. If you want to have some additional content in a portal page, you can add a new template. Just remember to include this additional template in the `portal_normal.vm` file or the `portal_pop_up.vm` file.

Updating Velocity templates

The Velocity templates control what to show on a portal page. We can change the content on a page by doing the following updates:

- Alter the values of Velocity references in the `${PLUGINS_SDK_HOME}/themes/${THEME_NAME}/docroot/_diffs/templates/init_custom.vm` file
- Change the content in the supporting templates such as `navigation.vm` and `portlet.vm`
- Insert custom templates in `portal_normal.vm`
- Add a portlet in a template that will show in the theme

We will see how these updates change a theme.

Customizing a theme through Velocity templates

On any project, there will be a custom theme. A client usually asks for the following customizations:

- Update the company logo
- Customize the dock or remove it
- Change the portlet icon
- Hide the maximize, minimize, and remove buttons from the non-admin users
- Customize the content in the footer part

As you know, customizing a theme includes work related to images, JavaScript, CSS, and templates. Now that we are focusing on Velocity in this chapter, we will update the `portal_normal.vm` file to see what can be achieved by editing a template.

Adding content through a template

We will create a Noir theme first.

- Run `create.bat noir Noir` in the `${PLUGINS_SDK_HOME}/themes/` directory. This will create a Noir theme
- Copy the `css/`, `images/`, `js/`, and `templates/` folders from `${AS_ROOT_HOME}/html/themes/classic/` to `${PLUGINS_SDK_HOME}/themes/noir-theme/docroot/_diffs/`
- Run `ant deploy` in `${PLUGINS_SDK_HOME}/themes/noir-theme/`

On the basis of the Noir theme, we will first add web content search functionality at the top, right-hand side corner of the page. Add the following snippet of code to the `portal_normal.vm` template:

```
<div class="search">
  $theme.journalContentSearch()
</div>
```

This piece of code is introduced with a `<div>` tag. It will create a web content search input box. You can input a keyword in that input box and press **Enter** to search for web content based on that keyword.

We will also add the following Velocity code in the `portal_normal.vm` template to display a page navigation line at the bottom, right-hand side corner of the page:

```
<div id="footer">
  // ignore details
  #parse ("$full_templates_path/bottom_navigation.vm")
</div>
```

This piece of code will parse a `bottom_navigation.vm` file, which will output an unordered list of links with page names. The list will be then transformed into a line of text through the CSS.

So we will add a `bottom_navigation.vm` file in the `${PLUGINS_SDK_HOME}/themes/noir-theme/docroot/_diffs/templates/` folder. Its content is as follows:

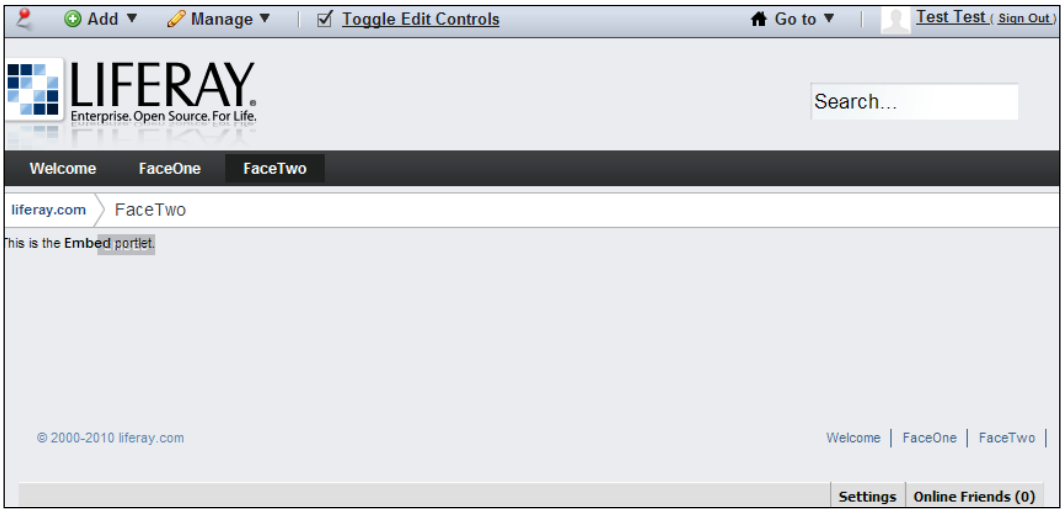
```
<ul>
  #foreach ($nav_item in $nav_items)
    #if ($nav_item.isSelected())
```

```
        #set ($nav_item_class = "selected")
      #else
        #set ($nav_item_class = "")
      #end
      <li class="$nav_item_class">
        <a href="$nav_item.getURL()" $nav_item.getTarget()><span>$nav_
item.getName()</span>
        </a>
      </li>
    #end
</ul>
```

We would also add some CSS code in the `${PLUGINS_SDK_HOME}/themes/noir-theme/docroot/_diffs/css/custom.css` file as follows:

```
#footer {
  background: url(../images/custom/footer_bg.jpg) no-repeat;
  color: #739ABE;
  height: 106px;
  position: relative;
  width: 962px;
}
// ignore details
```

After deployment of the Noir theme, here is what you will get on the page:



You can see the **Search...** input box at the top of the screenshot and the **Welcome** | **FaceOne** | **FaceTwo** | page navigation at the bottom.

Including a portlet in a theme

Sometimes it is required that we embed a portlet in a theme. We can embed a portlet in a theme through a Velocity template, say, `portal_normal.vm`.

The embedded portlet usually display a small amount of content. It may be intended for a login screen, for example. It may also be used to display some custom dynamic content. We can use the following steps to add a portlet to a theme:

1. Create a `Embed` portlet and deploy it.
2. In the `portal_normal.vm` file of the Noir theme add the following Velocity code:

```
<div>
  $theme.runtime("embed_WAR_embedportlet_INSTANCE_6CMo")
</div>
```

3. Re-deploy the Noir theme and refresh the page. The embedded portlet shows with borders.
4. Click on the configuration icon of the **Embed** portlet. Click on **Look and Feel.**
5. Uncheck **Show Borders** and click on **Save.**
6. Close **Look and Feel** and refresh the page – the portlet borders are gone.

You can see **This is the Embed portlet** in the screenshot above, which is the text displayed by the **Embed** portlet.

You can also use the following configuration in `${PLUGINS_SDK_HOME}/themes/embed-portlet/docroot/WEB-INF/portlet.xml` to turn off the borders:

```
<portlet-preferences>
  <preference>
    <name>portlet-setup-show-borders</name>
    <value>false</value>
  </preference>
</portlet-preferences>
```

You can even embed multiple portlets in a theme.

Using Liferay services in Velocity templates

There is another powerful feature that we can use in Velocity templates: invoking Liferay services. Liferay services can be used to access a lot of resources of the portal.

For example, we will try to use the `LayoutLocalService`. Here is the code:

```
#set($layoutService = $serviceLocator.findService("com.liferay.portal.
service.LayoutLocalService"))
#set($layouts = $layoutService.getLayouts($layout.getGroup().
getGroupId(), false))
#foreach ($page in $layouts)
  <span>$page.getName($locale) | </span>
#end
```

Copy this snippet of code and paste it at a convenient place in the `portal_normal.vm` file. When it runs, it will print out the names of all the public pages in this community. The page names will be delimited by a vertical bar.

Velocity does not have the functionality to handle exceptions while many Liferay services throw exceptions. To compensate for this, Liferay has defined a `findExceptionSafeService` method for the `$serviceLocator` object. So we can do this:

```
#set($layoutService = $serviceLocator.findExceptionSafeService("com.
liferay.portal.service.LayoutLocalService"))
```

When we use this method, if an exception is thrown in the `$layoutService`, it will not crash the Velocity engine. The `findExceptionSafeService` has wrapped the underlying service with a proxy, which catches the exception and simply returns null.

Liferay API related to Velocity templates

The following classes either insert the Velocity references and values into the Velocity context or merge Velocity templates:

- `com.liferay.portal.velocity.VelocityVariables`
- `com.liferay.portlet.journal.util.VelocityTemplateParser`
- `com.liferay.taglib.util.ThemeUtil`
- `com.liferay.taglib.util.VelocityTaglib`

Velocity template for e-mail

There are other uses for Velocity templates. For example, we can use a Velocity template for generating the body of an e-mail. We put the e-mail body in a template instead of hard-coding it in Java. We would also put the sender's name and the sender's e-mail address in a `portlet.properties` file.

1. Run `create.bat vmail Vmail` in the `${PLUGINS_SDK_HOME}/portlets/` directory to create a `Vmail` portlet.
2. Create a `${PLUGINS_SDK_HOME}/portlets/vmail-portlet/docroot/WEB-INF/src/com/sample/jsp/portlet/etemplate.vm` template with the following content:

   ```
   Thank you for your excellent work on $company.getProjectName() for
   $company.getCompanyName()
   ```

3. Create a `${PLUGINS_SDK_HOME}/portlets/vmail-portlet/docroot/WEB-INF/src/com/sample/jsp/portlet/JSPPortlet.java` file with the following content:

   ```
   String template = StringUtil.read(getClass().getClassLoader(),
   "com/sample/jsp/portlet/etemplate.vm", false);
   Ecompany eCom = new Ecompany();
   // ignore details
   variables.put("company", eCom);
   String fromAddress = PortletProps.get("fromEmailAddr");
   // ignore details
   String body = Velocity.evaluate(velocityContext, strWriter,
   JSPPortlet.class.getName(),template);
   // ignore details
   String toEmailAddr = ParamUtil.getString(actionRequest,
   "emailAddr");
   // ignore details
   InternetAddress from = new InternetAddress(fromAddress, fromName);
   // ignore details
   MailServiceUtil.sendEmail(message);
   ```

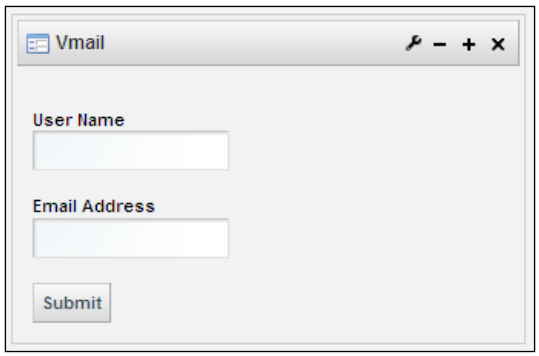
4. Add the following code in the `${PLUGINS_SDK_HOME}/portlets/vmail-portlet/docroot/view.jsp` file:

   ```
   <aui:form action="<%= emailActionURL %>" method="post" name="fm1">
     // ignore details
     <td><aui:input label="User Name" name="userName" /></td>
     // ignore details
     <td><input type="submit" value="Submit" /></td>
     // ignore details
   </aui:form>
   ```

5. Ant-deploy the `Vmail` portlet.

The code reads in the `com/sample/jsp/portlet/etemplate.vm` email template as a string. A `com.sample.jsp.portlet.Ecompany` object is initialized and put in a `java.util.Map` object. The `java.util.Map` object and the template string are passed into the Velocity engine for merging. The merged template string is sent to the user as the body text of an e-mail. The username and user e-mail address are got from the user interface.

After you add the `Vmail` portlet to a page, you will see this:



After you input the username and e-mail address and click on the **Submit** button, an e-mail will be sent to the user (if the mail server has been set up correctly). The e-mail body will be generated based on the `${PLUGINS_SDK_HOME}/portlets/vmail-portlet/docroot/WEB-INF/src/com/sample/jsp/portlet/etemplate.vm` Velocity template.

Velocity references for templates

Many Velocity references are placed in the Velocity context in the `insertHelperUtilities(…)` method of `the com.liferay.portal.velocity.VelocityVariables` class. Others are added in the `doTransform(...)` method of the `com.liferay.portlet.journal.util.VelocityTemplateParser` class.

References for both themes and web content

These references are put in the Velocity context in the `insertHelperUtilities(...)` method of the `com.liferay.portal.velocity.VelocityVariables` class.

You can use the $ sign to directly reference these objects in theme templates and web content templates:

Object	Description
arrayUtil	A com.liferay.portal.kernel.util.ArrayUtil_IW object
auditMessageFactoryUtil	A com.liferay.portal.kernel.audit.AuditMessageFactory object
auditRouterUtil	A com.liferay.portal.kernel.audit.AuditRouter object
browserSniffer	A com.liferay.portal.kernel.servlet.BrowserSniffer object
dateFormatFactory	A com.liferay.portal.kernel.util.FastDateFormatFactory object
dateTool	An org.apache.velocity.tools.generic.DateTool object
dateUtil	A com.liferay.portal.kernel.util.DateUtil_IW object
escapeTool	An org.apache.velocity.tools.generic.EscapeTool object
expandoColumnLocalService	A com.liferay.portlet.expando.service.impl.ExpandoColumnLocalServiceImpl object
expandoRowLocalService	A com.liferay.portlet.expando.service.impl.ExpandoRowLocalServiceImpl object
expandoTableLocalService	A com.liferay.portlet.expando.service.impl.ExpandoTableLocalServiceImpl object
expandoValueLocalService	A com.liferay.portlet.expando.service.impl.ExpandoValueLocalServiceImpl object
getterUtil	A com.liferay.portal.kernel.util.GetterUtil_IW object
htmlUtil	A com.liferay.portal.kernel.util.Html object
httpUtil	A com.liferay.portal.kernel.util.Http object
imageToken	A com.liferay.portal.kernel.servlet.ImageServletToken object
iteratorTool	An org.apache.velocity.tools.generic.IteratorTool object
journalContentUtil	A com.liferay.portlet.journalcontent.util.JournalContent object

Object	Description
languageUtil	A com.liferay.portal.kernel.language.Language object
unicodeLanguageUtil	A com.liferay.portal.kernel.language.UnicodeLanguage object
listTool	An org.apache.velocity.tools.generic.ListTool object
localeUtil	A com.liferay.portal.kernel.util.LocaleUtil object
mathTool	An org.apache.velocity.tools.generic.MathTool object
numberTool	An org.apache.velocity.tools.generic.NumberTool object
paramUtil	A com.liferay.portal.kernel.util.ParamUtil_IW object
portalUtil	A com.liferay.portal.util.Portal object, can be restricted
portal	A com.liferay.portal.util.Portal object, can be restricted
prefsPropsUtil	A com.liferay.portal.util.PrefsPropsUtil_IW object, can be restricted
propsUtil	A com.liferay.portal.util.PropsUtil_IW object, can be restricted
portletURLFactory	A com.liferay.portlet.PortletURLFactory object
velocityPortletPreferences	A com.liferay.portal.velocity.VelocityPortletPreferences object
randomizer	A com.liferay.portal.kernel.util.Randomizer object
saxReaderUtil	A com.liferay.portal.xml.SAXReaderImpl object
serviceLocator	A com.liferay.portal.velocity.ServiceLocator object, can be restricted
sessionClicks	A com.liferay.portal.util.SessionClicks_IW object, can be restricted
sortTool	An org.apache.velocity.tools.generic.SortTool object
staticFieldGetter	A com.liferay.portal.kernel.util.StaticFieldGetter object

Object	Description
stringUtil	A com.liferay.portal.kernel.util.StringUtil_IW object
timeZoneUtil	A com.liferay.portal.kernel.util.TimeZoneUtil_IW object
utilLocator	A com.liferay.portal.velocity.UtilLocator object, can be restricted
unicodeFormatter	A com.liferay.portal.kernel.util.UnicodeFormatter_IW object
validator	A com.liferay.portal.kernel.util.Validator_IW object
accountPermission	A com.liferay.portal.service.permission.AccountPermissionImpl object
commonPermission	A com.liferay.portal.service.permission.GroupPermissionImpl object
groupPermission	A com.liferay.portal.service.permission.GroupPermissionImpl object
layoutPermission	A com.liferay.portal.service.permission.LayoutPermissionImpl object
organizationPermission	A com.liferay.portal.service.permission.OrganizationPermissionImpl object
passwordPolicyPermission	A com.liferay.portal.service.permission.PasswordPolicyPermissionImpl object
portalPermission	A com.liferay.portal.service.permission.PortalPermissionImpl object
portletPermission	A com.liferay.portal.service.permission.PortletPermissionImpl object
rolePermission	A com.liferay.portal.service.permission.RolePermissionImpl object
userGroupPermission	A com.liferay.portal.service.permission.UserGroupPermissionImpl object
userPermission	A com.liferay.portal.service.permission.UserPermissionImpl object

For the Velocity references that can be restricted, we can disable them so that they are not available for use in the web content templates. We disable them by updating the configuration as follows in the `portal-ext.properties` file:

```
journal.template.velocity.restricted.variables=serviceLocator
```

The mentioned configuration says that a developer will not be able to use the `serviceLocator` reference in a web content template. This is the default setting in the `portal.properties` file.

References for themes

These references are placed in the Velocity context in the `insertVariables(...)` method of the `com.liferay.portal.velocity.VelocityVariables` class. They are only available for use in a theme template. Refer to the following list:

Object	Description
`request`	A `javax.servlet.http.HttpServletRequest` object.
`portletConfig`	A `com.liferay.portlet.PortletConfigImpl` object.
`renderRequest`	A `javax.portlet.RenderRequest` object.
`renderResponse`	A `javax.portlet.RenderResponse` object.
`xmlRequest`	An object whose `toString()` method has been overridden.
`themeDisplay`	A `com.liferay.portal.theme.ThemeDisplay` object.
`company`	A `com.liferay.portal.model.Company` object.
`user`	A `com.liferay.portal.model.User` object.
`realUser`	A `com.liferay.portal.model.User` object.
`layout`	A `com.liferay.portal.model.Layout` object.
`layouts`	A `java.util.List` object, It contains a list of `com.liferay.portal.model.Layout` objects.
`plid`	A string.
`layoutTypePortlet`	A `com.liferay.portal.model.LayoutTypePortlet` object.
`scopeGroupId`	A `java.lang.Long` object.
`permissionChecker`	A `com.liferay.portal.security.permission.PermissionChecker` object.
`locale`	A `java.util.Locale` object.
`timeZone`	A `java.util.TimeZone` object.
`theme`	A `com.liferay.portal.model.Theme` object.
`colorScheme`	A `com.liferay.portal.model.ColorScheme` object.
`portletDisplay`	A `com.liferay.portal.theme.PortletDisplay` object.
`navItems`	A `java.util.List` object. It is a list of `com.liferay.portal.theme.NavItem` objects.
`fullCssPath`	A string.
`fullTemplatesPath`	A string.

Object	Description
`init`	A string, path to the `init.vm` template file.
`portletGroupId`	A `java.lang.Long` object.
`tilesTitle`	A string.
`tilesContent`	A string.
`tilesSelectable`	A string.
`pageTitle`	A string.
`pageSubtitle`	A string.

You can also define custom references for the theme templates:

- Create a `your.company.project.OwnServicePreAction` class to extend the `com.liferay.portal.events.ServicePreAction` class. Add custom references in this class. Compile it and put it on the classpath of Liferay
- Reference it in the `portal-ext.properties` file as follows:

```
servlet.service.events.pre=com.liferay.portal.events.
ServicePreAction, your.company.project.OwnServicePreAction
```

Your custom references will be picked up and added in the Velocity context by the following code in the `insertVariables(...)` method of the `com.liferay.portal.velocity.VelocityVariables` class:

```
Map<String, Object> vmVariables =
  (Map<String, Object>)request.getAttribute(WebKeys.VM_VARIABLES);
// ignore details
for (Map.Entry<String, Object> entry : vmVariables.entrySet()) {
  // ignore details
  velocityContext.put(key, value);
}
```

References for web content

These references are placed in the Velocity context in the `doTransform(...)` method of the `com.liferay.portlet.journal.util.VelocityTemplateParser` class.

- `xmlRequest`: A string
- `request`: A `java.util.HashMap` object
- `company`: A `com.liferay.portal.model.Company` object
- `companyId`: A string
- `groupId`: A string

- `journalTemplatesPath`: A string
- `viewMode`: A string
- `locale`: A `java.util.Locale` object
- `permissionChecker`: A `com.liferay.portal.security.permission.PermissionChecker` object
- `randomNamespace`: A string

As you must have noticed, the `request` and `xmlRequest` are not of type `javax.servlet.http.HttpServletRequest`.

Web content templates

Velocity templates have also been used in web content management in Liferay.

Web content, as displayed in the Web Content Display portlet, consists of three parts:

- Structure (optional)
- Template (optional)
- Content

The structure defines placeholders (variables) for content. The content is the value for the placeholder. The template defines where to put the content.

A web content template is like the `portal_normal.vm` template. While the `portal_normal.vm` template applies to a whole portal page, a web content template applies to the area within the Web Content Display portlet.

Here we will construct web content with a Velocity template in the following steps:

1. Log in as **test@liferay.com / test**.
2. Click on the **Manage** dropdown list and click on **Control Panel**.
3. Click on **Web Content** link.
4. Click on **Structures** link and click on **Add Structure** button.
5. Enter **WEEV-STRUCTURE** as **ID**. Enter name and description.
6. Click on the **Add Row** button five times and type in **css** as **Text Area (HTML)**, **image-url** as **Text**, **title** as **Text**, **description** as **Text**, **link-url** as **Text** and **link-name** as **Text**.
7. Save **WEEV-STRUCTURE**.
8. Click on the **Templates** link and click on the **Add Template** button.

9. Enter **WEEV-TEMPLATE** as **ID**. Enter name and description.
10. For **Structure**, click on **Select** button and choose **WEEV-STRUCTURE**
11. Click on the **Launch Editor** button. Remove all the existing content. Copy and paste the template content (code given after the screenshot) in the box. Click on **Update**.
12. Click on the **Save** button
13. Click on the **Web Content** link and click on the **Add Web Content** button
14. On the right-hand side under the **Template** tag, click on the **Select** button. Choose **WEEV-TEMPLATE**. A prompt pops up with **Selecting a template will change the structure**. Click on **OK**.
15. Fill out the boxes shown, with proper values. For the **css** and **description** boxes, first click on the **Source** button (for HTML markup input).
16. Click on **Publish**. We are done with web content creation. Click on the **Back to liferay.com** link on the top, left-hand side of the page.
17. Add a page, called, for example, **Content-page**, and go to that page.
18. Click on the **Add** drop-down list and click on **Web Content Display** link. The Web Content Display portlet will be added to the **Content-page**.
19. Click on the configuration icon on the bottom, left-hand side corner of the portlet. The configuration window pops up.
20. Click on the **WEEV-ARTICLE** web content and click on the **Save** button. Close the popup window.

You will see a page similar to the following screenshot:

Web Content Display
Tiger Year Parade
It was February 14, 2010. I was watching the Tiger Year Parade in China Town, Chicago. They were celebrating Spring Festival. I was the tallest guy there.
View my Toys

The content of `WEEV-TEMPLATE` is as follows:

```
$css.getData()
<table cellpadding="8" cellspacing="20">
  <tr>
    <td><img alt="" src="$image-url.getData()" width="120" /></td>
    <td>  </td>
    <td>
      <table>
        <tr><td><h2>$title.getData()</h2></td></tr>
        <tr><td>$description.getData()</td></tr>
        <tr>
          <td><a class="public_pages" href="$link-url.
getData()">$link-name.getData()</a></td>
        </tr>
      </table>
    </td>
    </tr>
</table>
```

The template is defined with HTML tables. Velocity references are used to get dynamically set values. The variables `css`, `image-url`, `title`, `description`, `link-url`, and `link-name` are declared in `WEEV-STRUCTURE`. Their values are supplied in `WEEV-ARTICLE`. The Velocity engine will merge this template. Eventually we get the previous screenshot. Simple!

What is happening?

The Velocity templates for a theme are in the `${THEME_NAME}/templates/` folder while a Velocity template for web content is saved in the database. How does Liferay know where to find them and how to load them? This logic has been implemented in the Velocity resource listeners. It has been configured in the `${PORTAL_SRC_HOME}/portal-impl/src/portal.properties` file as follows:

```
velocity.engine.resource.listeners=com.liferay.portal.velocity.
ServletVelocityResourceListener,com.liferay.portal.velocity.Jour
nalTemplateVelocityResourceListener,com.liferay.portal.velocity.
ThemeLoaderVelocityResourceListener,com.liferay.portal.velocity.
ClassLoaderVelocityResourceListener
```

All these listeners, which are separated by commas, inherit from the `com.liferay.util.velocity.VelocityResourceListener` class. Each of them returns an appropriate `java.io.InputStream` object for loading their respective Velocity template.

Freemarker templates

In a previous section, you may have noticed a file called `${PLUGINS_SDK_HOME}/themes/store-theme/docroot/_diffs/templates/portal_normal.ftl`. The file extension `.ftl` means that it is a FreeMarker template. This is a template made using FreeMarker. Liferay is considering FreeMarker as an option to Velocity for template generation.

This is an interesting trend for a Liferay fan to pay attention to.

The support of FreeMarker for themes in Liferay is new. The use of FreeMarker has not yet been thoroughly tested. However, some Liferay staff and developers are enthusiastic about FreeMarker.

What is FreeMarker really about?

FreeMarker is another template engine. It can be used to generate text output based on templates, just like Velocity.

FreeMarker has the following features:

- Charset aware (uses unicode internally)
- Locale sensitive number formatting
- Locale sensitive date and time formatting
- Non-US characters can be used in identifiers (as variable names)
- Multiple variations of the same template for different languages

In Liferay, you can find FreeMarker templates in the `${AS_ROOT_HOME}/html/themes/classic/templates/` folder. If a developer wants to write a new theme based on the Liferay Classic theme using FreeMarker, it is possible. The developer can create a FreeMarker theme in the same way as Velocity templates, except the template extension is `.ftl` instead of `.vm`. This is defined in the `${PLUGINS_SDK_HOME}/themes/${THEME_NAME}/docroot/WEB-INF/liferay-look-and-feel.xml` file as follows:

```
<look-and-feel>
  // ignore details
  <theme id="freemarker" name="FreeMarker">
    <template-extension>ftl</template-extension>
  </theme>
</look-and-feel>
```

The `liferay-look-and-feel.xml` file is automatically created in the `${THEME_NAME}/WEB-INF/` folder during deployment of the theme. You can create a theme and deploy it. Then copy the `liferay-look-and-feel.xml` file from the running AS and paste it in the `${PLUGINS_SDK_HOME}/themes/${THEME_NAME}/docroot/WEB-INF/` folder. There you update the template extension value.

FreeMarker is also an option for web content templates. It is simple to add FreeMarker engine for both themes and web content.

FreeMarker has been used in Liferay's `ServiceBuilder`. Liferay staff started `ServiceBuilder` using Velocity. They faced difficulty in accessing static fields. So the developers eventually switched to FreeMarker for generating the source code.

What is the present situation then? Velocity has been with Liferay for many years. Liferay developers are accustomed to Velocity templates. "It is core to Liferay." (Liferay portal, in a sense, is a Velocity servlet.)

Let us wait and see if Liferay is really going to switch to FreeMarker templates or not.

What's happening?

Like Velocity templates, the FreeMarker templates work behind configurations in the `${PORTAL_SRC_HOME}/portal-impl/src/portal.properties` file:

```
freemarker.engine.template.loaders=com.liferay.portal.freemarker.Servl
etTemplateLoader,com.liferay.portal.freemarker.JournalTemplateLoader,c
om.liferay.portal.freemarker.ThemeLoaderTemplateLoader
```

These FreeMarker template loaders, which are delimited by commas, extend the `com.liferay.portal.freemarker.FreeMarkerTemplateLoader` class. By running these classes, Liferay will find an applicable loader to read the FreeMarker template specified.

```
freemarker.engine.macro.library=FTL_liferay.ftl
```

This setting, also in the `${PORTAL_SRC_HOME}/portal-impl/src/portal.properties` file, specifies where the FreeMarker macros can be found. The `FTL_liferay.ftl` file should be on the classpath of Liferay.

Source code

The following files include source code for this chapter. They have been attached to this chapter.

- `embed-portlet.zip`: It is for the `Embed` portlet, which is inserted in the Noir theme
- `noir-theme.zip`: The Noir theme is used to explain how we can change a theme with Velocity templates
- `store-theme.zip`: This goes with the procedure to re-build the Liferay Classic theme in the Plugins SDK
- `velocity-portlet.zip`: This is for the Velocity portlet
- `vmail-portlet.zip`: This explains how we can use a Velocity template to represent the body of an e-mail
- `WEEV-ARTICLE.txt`: It contains code for the structure, template, and article as needed in explaining the web content template

Summary

In this chapter, we have reviewed the knowledge about Velocity and studied the Velocity templates in a Liferay theme. We have learned about the following:

- Velocity is a technology for web applications to separate presentation and business logic
- We can use a Velocity template to build a JSR 286 compliant portlet in Liferay
- A Liferay theme consists of five Velocity templates. Each template controls a different part of a portal page
- We can update a Velocity template from the Classic theme to create our own themes
- Good design of the Velocity templates can improve the site performance
- Portlets and custom templates can be inserted into the `portal_normal.vm` template to add content in a theme
- A Velocity template can also be used in generating an e-mail
- Liferay has various out-of-the-box Velocity references for writing templates
- Velocity templates are also used in the Web Content portlet
- FreeMarker is another option in creating theme templates

With the expertise that you have gained in this chapter, it is expected that you can now manipulate a theme with Velocity templates in Liferay.

In the next chapter, we will look into the newly-added feature in Liferay—the Alloy UI.

8
Alloy User Interface

Alloy **User Interface** (**UI**) makes patterns out of the common UI features. A developer can save time by directly applying these patterns. In this way, he can do more creative work for a project. In this chapter, we will learn the following aspects of Alloy UI:

- The story of Alloy UI
- What Alloy UI consists of
- What Liferay wants to achieve with Alloy UI
- Alloy form tags
- Node and Nodelist
- Ajax in Alloy UI
- Alloy Plugin
- Widgets
- Other Alloy UI features

We will talk about the technical aspects of Alloy UI and learn with the help of examples.

Story of Alloy UI

Alloy is one of Liferay's efforts to facilitate UI implementation. Liferay already has **build-service** for generating database access code. It also has Ant script to create a prototype of a **JavaServer Pages** (**JSP**) portlet. Now the view side has been taken care of in its Alloy UI Project. Alloy UI has been developed in collaboration with Yahoo!'s YUI project.

Previously, Liferay used jQuery API for its UI. Although a developer can still use jQuery for coding the view side of his application, Liferay people have stopped using it for their portlets and other plugin applications.

What Alloy UI consists of

Alloy UI has combined **HyperText Markup Language 5** (**HTML5**), **Cascading Style Sheets Level 3** (**CSS3**), and **Yahoo! User Interface Version 3** (**YUI3**). It has been constructed with Liferay's best view practices. Alloy UI is robust and flexible.

Alloy UI uses markup as defined in HTML5 for structuring of a page. It applies CSS3 style to **Document Object Models** (**DOM**). For the dynamic behavior on a portal page, Alloy UI employs YUI3.

On its website `http://alloy.liferay.com/`, there are demos that show image gallery, autocomplete, color picking, and live search.

Alloy UI library is an independent package. It is not tied to Liferay. A developer is encouraged to use it in other web applications.

Goals of Alloy UI

Alloy UI is simple code for professional user interface. It contains custom form tags. It also has classes for autocompletion, animation, character counter, drag-and-drop, delayed task, overlay, plugin IO, **ShockWave Flash** (**SWF**), sortable list, tree view, and tool tip. A developer initiates a class in a sandbox and an advanced UI feature is readily available. Alloy UI means richer user experience with less code.

Alloy UI helps to improve the coding efficiency as well. With a bunch of user interface components, a UI developer can quickly create various widgets for the portlets and other web applications.

In addition, Alloy UI takes care of the browser compatibility. Its API will have been tested with all the major web browsers before it is released. It will work in Firefox, Internet Explorer, Safari, and Opera.

What is HTML5?

HTML5 is the next major revision of the standard HTML. Its immediate predecessors are HTML 4.0.1 and XHTML 1.1. Although HTML5 is still a work in progress, Safari, Chrome, Firefox, and Opera already support some of its features in their latest versions. Internet Explorer 9 will also be available to support some HTML5 features.

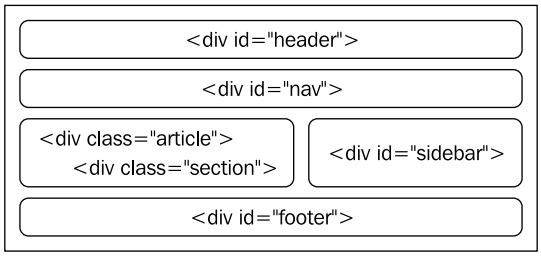
HTML5 has introduced some very impressive features:

- The content elements such as `header`, `nav`, `article`, `section`, and `footer`
- The `canvas` element for drawing

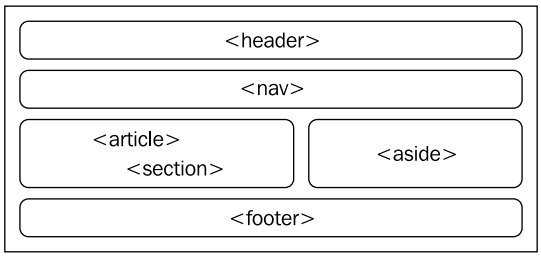
- The `video` and `audio` elements for multimedia
- Form control elements including `calendar`, `date`, `time`, `email`, and `search`
- Improved support for offline local storage

How are these new HTML5 elements used?

In HTML 4, we may structure a page in the following way:



HTML5 has introduced new elements to structure a page. We use the `header`, `nav`, `article`, `section`, `aside`, `footer`, and other new elements to lay out a page:



Actually, the page structure given here is for a regular website. For a portal such as Liferay, this is simplistic. In Liferay, the `article` and `aside` elements are replaced with a layout, which is populated with portlets.

For example, the `article` of HTML5 is now called web content in Liferay. Liferay has a Web Content portlet and a Web Content Display portlet to take care of this.

Here is the simplified code in the `portal_normal.vm` template of Liferay. It shows the structure of a complete Liferay portal page:

```
<!DOCTYPE html>
<html>
  <head>
    <title></title>
  </head>
  <body class="$css_class">
```

```
      <div id="wrapper">
        <header id="banner" role="banner">
        </header>
        <div id="content">
          <nav class="site-breadcrumbs" id="breadcrumbs">
          </nav>
          <!-- layout and portlets come here -->
        </div>
        <footer id="footer" role="contentinfo">
        </footer>
      </div>
    </body>
  </html>
```

Please notice the `<!DOCTYPE html>` tag. This is the HTML5 syntax for representing an HTML document. You can also find `header`, `nav`, and `footer` elements in this document.

HTML5 has also introduced the `<video>` and `<audio>` tags. Right now, video and audio playback is supported by browser plugins such as Flash, RealPlayer, and QuickTime. In HTML5, you can include the following markup in your page:

```
<video src="/hot/trailer/rings.ogg" controls="controls"
  poster="alt.png" width="600" height="300">
    Your browser does not support the video tag.
</video>
```

The `<video>` tag defines a movie clip or other video streams. The `controls` attribute is optional. When it is present, controls, such as a play button, will be displayed. The optional `poster` attribute can be used to specify an image to be shown before the video has started. The `width` attribute sets the width of the video player. Between the start and the end tags you can include text to inform a user when his browser doe not support the `<video>` tag.

This snippet of markup plays the `rings.ogg` video in Firefox 3.6.

The following markup plays a cock crow:

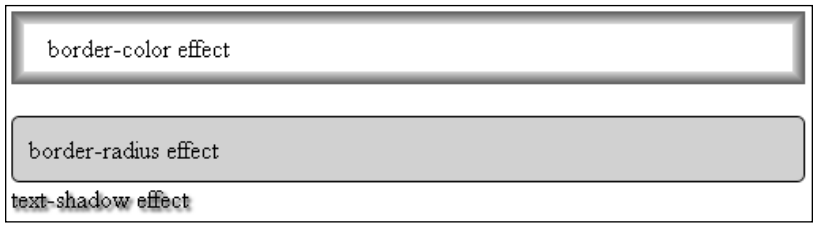
```
<audio src="cock.ogg" controls="controls">
  Your browser does not support the audio element.
</audio>
```

The `<audio>` tag defines music and other sound streams. The `src` attribute defines the URL of the audio to play.

What is CSS3 about?

CSS3 is an improved version of CSS Level 2. It is designed to enforce stricter requirements for standards. Unlike CSS Level 2, CSS3 has been modularized for the ease of upgrading.

People have proposed many exciting new functionalities and features for CSS3. For example, it has `border-color`, `border-radius` and `text-shadow` modules. These modules give the following effect in Firefox 3.6:



Their CSS code is as follows:

```
<div style="border: 8px solid #000;
  -moz-border-bottom-colors: #555 #666 #777 #888 #999 #aaa #bbb #ccc;
  -moz-border-top-colors:    #555 #666 #777 #888 #999 #aaa #bbb #ccc;
  -moz-border-left-colors:   #555 #666 #777 #888 #999 #aaa #bbb #ccc;
  -moz-border-right-colors:  #555 #666 #777 #888 #999 #aaa #bbb #ccc;
  padding: 5px 5px 5px 15px;">
    border-color effect
</div><br />
<div style=" background-color: #ccc;
  -moz-border-radius: 5px;
  -webkit-border-radius: 5px;
  border: 1px solid #000;
  padding: 10px;">
    border-radius effect
</div>
<div style="text-shadow: 2px 2px 2px #000;">
  text-shadow effect
</div>
```

Other CSS3 modules include:

- background-size
- HSL colors
- text-overflow
- box-sizing
- resize
- attribute selectors
- overflow-x, overflow-y
- content
- media queries
- multi-column layout

Why YUI3?

YUI3 is the next-generation JavaScript and CSS library of Yahoo!. YUI has been used to write the Yahoo! website pages. All YUI code is under the **Berkeley Software Distribution** (**BSD**) license. The public can use it and contribute to it.

A sample piece of YUI3 code is like this:

```
YUI().use('node', function(Y) {
  var node = Y.one('#greet');
  node.setContent("Hi, I am YUI3.");
});
```

YUI3 uses the notion of sandbox. Your UI code is encapsulated in a sandbox. In the previous code snippet, this is the sandbox:

```
YUI().use('node', function(Y) {
  // your code here
});
```

Here YUI is a global object in the YUI3 library. `YUI()` will return an instance of the `YUI` class. The `use` method allows you to get the modules and load them into your YUI instance. The above code loads the `node` module into the sandbox so that you can use `Y.one('#greet')` to get the element with ID `greet` in the webpage and manipulate it. The `function(Y)` is the last argument for the `use` method. That function has an argument `Y`, which is a reference to the YUI instance.

The above code gets the element with ID `greet`. It then sets the content of the element to **Hi, I am YUI3**.

There are other modules that you can load into a YUI instance.

```
YUI().use('dd-drop', 'anim', function(Y) {
    // Y.DD is available
    // Y.Anim is available
});
```

This snippet of code loads the drag-and-drop module and the animation module into the sandbox. The `use` method takes multiple arguments. The preceding ones are module names. The last one must be a function. This function will execute after the `YUI` instance has loaded all the modules.

YUI3 is a complete re-write, although it is based on the experience in YUI2. So it is said to be revolutionary, which means that it is not evolutionary. It has the following new features:

- The old `YAHOO` global object has been changed to YUI global object.
- Selector-driven: YUI3 is based on a selector engine. You can pass CSS selector strings to fetch any element on the page.
- Cleaner, succinct syntax: You can get an element with code: `Y.get('.creator')`. A big module in YUI2 has been split into smaller self-contained sub-modules. In this way you do not have to include a whole API to do a single method call.
- Using node and nodelist: A node refers to one DOM element while a nodelist contains multiple elements, say, with the same class name. The node reference includes all the functionalities that a developer needs to interact with a node.
- Sandboxed: A YUI module is bound to a YUI instance when the `use` method is called. Every execution of YUI returns a self-contained environment where the library and loaded elements can run without interfering with other instances of YUI on the same page.

All YUI3 features apply in Liferay Alloy UI. Alloy UI is built based on YUI3 and it extends YUI3. We will see examples of the mentioned features of YUI3 in Alloy UI.

Alloy UI form tags

In Alloy UI, Liferay has customized form elements into **JavaServer Pages Standard Tag Library** (**JSTL**) tags. The `form` elements start with `aui`, like in the following piece of code:

```
<aui:form action="<%= editArticleActionURL %>" enctype="multipart/
form-data" method="post" name="fm1">
</aui:form>
```

These `aui` tags are defined in `${AS_ROOT_HOME}/WEB-INF/tld/liferay-aui.tld`. They are interpreted by classes in the `com.liferay.taglib.aui` package.

Alloy `form` tags provide another option to regular HTML `form` tags. While you can still use the regular form tags in Liferay, the customized Alloy `form` tags make UI coding easier:

- Alloy `form` tags have defined additional attributes for an element, which means that a developer has more power in manipulating the element.
- Alloy `form` tags have added abstraction. For example, they automatically add a prefix to an element name with a portlet namespace. A developer does not have to worry about the portlet namespace when using an Alloy `form` tag.

Let us have a look at the `form` tag. This tag is interpreted by the `com.liferay.taglib.aui.FormTag` class. Besides the `action`, `enctype`, `method`, and `name` attributes, it also has the following optional attributes:

- `escapedXml`: Set this to `false` if you do not want the action URL to be encoded
- `cssClass`: It provides additional values for the class attribute
- `inlineLabel`: If this attribute is set to `true`, all the labels will be inline with their respective input fields

Other commonly used Alloy UI form tags are given in the following sections.

The button tag

There is also a `button` tag:

```
<aui:button name="removeArticleLocaleButton" onClick='<%=
renderResponse.getNamespace() + "removeArticleLocale();" %>'
type="button" value="remove" />
```

This tag is translated by the `com.liferay.taglib.aui.ButtonTag` class. It has the following custom attributes:

- `cssClass`: Its value is style class names for additional styling
- `first`: Set it to true if this button is the first element in the form
- `last`: Set this to true if this button is the last element in the form
- `value`: The label on the button. If it is empty, the value will be **Save** for submit type buttons and **Cancel** for cancel type buttons

The button-row tag

The `button-row` tag includes multiple `button` tags into a group:

```
<aui:button-row>
  <aui:button name="previewArticleBtn" value="preview" />
  // ignore details
</aui:button-row>
```

It is interpreted by the `com.liferay.taglib.aui.ButtonRowTag` class. It has an additional attribute `cssClass` that provides additional values for the class attribute.

The column tag

Here is the `column` tag. It is used within the `layout` tag:

```
<aui:layout>
  <aui:column columnWidth="10" first="true">
    // ignore details
  </aui:column>
  // ignore details
</aui:layout>
```

This tag is interpreted by the `com.liferay.taglib.aui.ColumnTag` class. It has the following attributes:

- `columnWidth`: It specifies the width of the column. It is a percentage value. Valid values are: 10, 15, 20, 25, 28, 30, 33, 35, 40, 45, 50, 55, 60, 62, 65, 66, 70, 75, 80, 85, 90, 95.
- `cssClass`: It introduces additional CSS class names.
- `first`: Set this to `true` if this column is the first within the `layout` tag.
- `last`: Set this to `true` if this column is the last within the `layout` tag.

The fieldset tag

Here is the markup for the `fieldset` tag:

```
<aui:fieldset>
  <aui:input name="description" />
  // ignore details
</aui:fieldset>
```

The Liferay `fieldset` includes all the input fields into a group. It is interpreted by the `com.liferay.taglib.aui.FieldsetTag` class. It has these attributes:

- `cssClass`: Its value is custom class names for additional style information
- `column`: Set this to `true` if you want the field set to be displayed as a column instead of a row

The input tag

Here is an example of the `input` tag:

```
<aui:input bean="<%= article %>" model="<%= JournalArticle.class %>"
label="name" name="title" />
```

This `input` tag is run by the `com.liferay.taglib.aui.InputTag` class. Besides the traditional attributes for a regular input element, it has additional Liferay-only attributes:

- `label`: This displays the label. If this attribute is used and its value is an empty string, no label will be shown. If the attribute is not used, the label will be got from the input name.
- `first`: Set this to `true` if it is the first element in the form. It can be used for styling purpose.
- `last`: Set this to `true` if it is the last element in the form.
- `helpMessage`: This is an interesting one. Its value is the message to display when the user moves the cursor over a question mark icon next to the field label.
- `inlineField`: If its value is `true`, this field will be inline with the next form element.
- `inlineLabel`: Set this to `left` if you want this field to be inline with its label on the left-hand side of the input field; set it to `right` if you want the field to be inline with its label on the right-hand side of the input field.
- `suffix`: Message to display to the right of the input field.
- `prefix`: Message to display to the left of the input field.
- `bean`: The object that will be accessed to get the value for this input element.
- `model`: The Java class of the bean object.

The layout tag

The following is the `layout` tag:

```
<aui:layout>
  <aui:column columnWidth="10" first="true">
    // ignore details
  </aui:column>
  <aui:column columnWidth="90" last="true">
    // ignore details
  </aui:column>
</aui:layout>
```

The `layout` tag divides the page area into several columns. It is interpreted by the `com.liferay.taglib.aui.LayoutTag` class. It uses the `div` elements to create those columns. Its attribute is `cssClass`. Its value is additional CSS class names as the value for the class attribute.

The legend tag

Here is the markup for the `legend` tag:

```
<aui:fieldset>
  <aui:legend value="log-in-through-openid" />
  <aui:input cssClass="openid-login" name="openId" type="text"
value="<%= openId %>" />
  // ignore details
</aui:fieldset>
```

The `legend` tag is used in the `fieldset` tag. It is interpreted by the `com.liferay.taglib.aui.LegendTag` class. It has the following attributes:

- `cssClass`: It introduces additional styling class names
- `label`: It is for the label of the `legend` tag

The link tag

The following is the `link` tag:

```
<aui:a href="<%= editArticleURL %>"><%= article.getArticleId() %></
aui:a>
```

The `link` tag is interpreted by the `com.liferay.taglib.aui.ATag` class. It has the following custom attributes:

- `cssClass`: Its value is additional CSS class names as values for the class attribute
- `label`: Its value is the content of the link element

The model-context tag

The `model-context` tag is used to introduce an object that will be accessed in the page context.

```
<aui:model-context bean="<%= article %>" model="<%= JournalArticle.
class %>" />
```

It is interpreted by the `com.liferay.taglib.aui.ModelContextTag` class. Its attribute is as follows:

- `bean`: The object that is introduced
- `model`: The Java class of the object

The option tag

The following is the `option` tag:

```
<aui:option label="<%= defaultLocale.getDisplayName(defaultLocale) %>"
value="<%= defaultLanguageId %>" />
```

This tag is, of course, used within the `select` tag. It is interpreted by the `com.liferay.taglib.aui.OptionTag` class. It has the following custom attributes:

- `cssClass`: It references additional CSS class names for styling, like that in `<div class="aui-layout-content <%= cssClasses %>">`
- `label`: Value of this attribute is the label to show for this option

The select tag

Then there is the `select` tag.

```
<aui:select disabled="<%= article == null %>" id="languageIdSelect"
label="language" name="languageId">
  <aui:option label="<%= locales[i].getDisplayName(locale) %>"
selected="<%= languageId.equals(LocaleUtil.toLanguageId(locales[i]))
%>" value="<%= LocaleUtil.toLanguageId(locales[i]) %>" />
  // ignore details
</aui:select>
```

The `select` tag is interpreted by the `com.liferay.taglib.aui.SelectTag` class. It has the following custom attributes:

- `bean`: The object to be referenced. It can only be used together with `listType`.
- `listType`: Its value is the name of the `ListType`. The interpreting class will use this attribute to generate all the options for this select element.
- `showEmptyOption`: Set this to true to add an empty option as the first option.
- `cssClass`: Its value is custom class names for styling.
- `first`: Set it to `true` if this `select` element is the first form element.
- `last`: Set this to `true` if this `select` element is the last element in the form.
- `helpMessage`: Message to tell a user how to select items in this element. When the user hovers the cursor on the question mark icon, it shows.
- `label`: It is the label to show for this element.
- `inlineField`: If this is set `true`, this element will be inline with the next element in the form.
- `inlineLabel`: Set its value to `left` if you want the label to be inline with the field with the label on the left-hand side; set its value to `right` if you want the label to be inline with the field with the label on the right-hand side.
- `suffix`: Its value is the message to display on the right-hand side of the `select` element.

Alloy UI tags are secure, accessible and consistent. They are comprised of explicit labels, accessible help messages and interactive warnings. What is more is that they validate HTML by default!

A sample portlet has been attached for this section. The name of the portlet is `iShop`. In this portlet you can see how the above tags are used in a real situation. You can also use the portlet as a prototype to develop your own portlets in Liferay.

Next, we will talk about the JavaScript and CSS aspects of Alloy UI.

Node and Nodelist

`Node` is the interface for DOM operations in Alloy UI. The `Node` API is based on DOM. Additionally, a `Node` instance (`node`) has properties and methods that make its manipulation easier—it is a *wrapped* DOM element. A `node` is for a single element, while a `nodelist` (`Nodelist` instance) is for a collection of elements.

To manipulate a `node`, we must put our JavaScript code in such a sandbox as follows:

```
AUI().use('node', function(A) {
  var aNode = A.one('#demo');
});
```

The Alloy UI sandbox is the same as the YUI sandbox, as we have studied in the YUI3 section. `AUI()` creates an instance of the `AUI` class. The `use` method loads the node module including all the required JavaScript files into the context. The `function(A)` is a callback method. Its only argument `A` is the AUI instance that has just been created.

By `A.one('#demo')` we get a DOM element whose ID is `demo` on the page. If the element is really there, we can then add content to it, change its style or remove it from the page.

There are other ways to get an element in a webpage, stated as follows:

```
var bNode = A.one('.demo');
```

This snippet of code looks for an element with a class name of `demo` in the page. A CSS class may be applied to multiple elements on a page, and if the code finds such an element, it returns it. If it finds none, it returns null, and if it finds more than one, it returns the first one.

The following snippet of code looks for an input element with a type of checkbox and returns it:

```
var cNode = A.one('input[type=checkbox]');
```

Because `A.one('#demo')` will return null if that element cannot be found on the page, we should take care of the situation with the following code:

```
if(aNode) {
  aNode.setStyle('width', 100);
}
```

This will avoid a null pointer exception.

Please notice that we use `aNode.setStyle` to change the width of the element instead of `aNode.width='100'`. This is because Alloy UI has wrapped the DOM element. It is now like a Java class object.

What if we want to get all the elements on the page with a CSS class name of `demo-style`? We can use the following snippet of code:

```
A.all('.demo-style');
```

If this snippet of code finds multiple elements with CSS class name of `demo-style`, it will return all of them. If it finds only one such element, it will return that element, and if it finds none, it will return an empty list. It will *not* return null.

As `A.all` will not return null, we can use the following code to avoid a null check:

```
A.all('#demo').setStyle('width', 100);
```

Expressions such as `#demo`, `.demo-style`, and `input[type=checkbox]` are selectors. We use these selectors to select HTML elements on a webpage.

What other selectors can we use? By default, we can use all the selectors in CSS2. The following are some examples:

- `div p`
- `li a`
- `[href]`
- `input[name^=lfr]`

CSS3 selectors are not supported by default with `Node`. We need to load the `selector-css3` module for CSS3 support.

Now, we will talk more about `Node` and `Nodelist`.

Node properties

We use `get` and `set` to access the `Node` properties. Assuming that we are in an Alloy UI sandbox with the `node` module populated, the following snippet of code returns the parent `Node` instance of `aNode`:

```
var aNode = A.one('#demo');
var aParent = aNode.get('parentNode');
```

The following code sets its background color to red:

```
aNode.setStyle('backgroundColor', '#f00');
```

How can we set multiple styles at once? We can do this as follows:

```
aNode.setStyles({
   height: 100,
   width: 200
});
```

Events

We use the `on` method to add an event listener to a `Node` instance. The first argument for the `on` method is the event name. The second argument is a callback function. It defines what will happen to the `node` when that event is invoked.

```
AUI().use('node', function(A) {
    A.one('#demo').on('click', function(e) {
    e.preventDefault();
    alert('event: ' + e.type + ' target: ' + e.target.get('tagName'));
  });
});
```

In the previous snippet of code, when the DOM element with an ID of `demo` is clicked on, the default reaction will be dismissed. Instead, a user will see an alert message about the event.

We can also define a mouse-over event.

```
aNode.on('mouseenter', function(event){
   this.setStyle('border', '3px solid #555');
});
```

Please notice that `this` is a reference to the `Node` instance we are dealing with.

We can also delegate an event in the Alloy UI. What does that mean?

In event delegation, you define an event handler with a parent node. This event handler will listen for an event on all the descendant elements of the parent node.

In the following snippet of code, `demo` is the ID of an unordered list. It has multiple list items each with a `<li>` tag.

```
var aNode = A.one('#demo');
aNode.delegate('click', function(event){
   alert(event.currentTarget.html());
}, 'li');
```

The `delegate` method has three arguments. The first argument, `click`, is the event type. The `function(event)` is the callback method. The third argument is the target of the event. This means that, when a child element of the `demo` element is clicked on, the callback method will run and display an alert with the list item text.

When a new list item is added to this unordered list, the event is automatically attached to that list item. This saves a lot of coding.

More Node methods

The `Node` API has defined extra methods to help with DOM element manipulation.

```
AUI().use('node', function(A) {
  var aNode = A.one('#demo');
  var bNode = aNode.appendChild(A.one('#Chicago'));
  bNode.addClass('summer');
});
```

This snippet of code finds a `demo` element on the page. It appends to it a child element whose ID is `Chicago`. The `appendChild` method returns a `Node` instance for the `Chicago` element. The code then adds a `summer` CSS class to the `Chicago` node.

Additionally, we can update the innerHTML of a DOM element:

```
aNode.html('<b>Updated content</b>');
```

We can also remove an element from a page:

```
aNode.remove();
```

We create a new node from scratch:

```
var dNode = A.Node.create('<div id="added">Content</div>');
```

Manipulating nodelist

We use the `A.all` method to get a `Nodelist` instance. We manipulate a nodelist in a similar way to that for a node.

```
AUI().use('node', function(A) {
  A.one('#appleTree').get('children').addClass('ripe');
});
```

The previous piece of code finds an `appleTree` element on the page. It gets all its child elements and applies a `ripe` CSS class to those child elements.

Please notice that the `get('children')` method returns a list of `Node` instances.

The following snippet of code fetches the list items of a `demo` element on the page and applies a `short` CSS class to them.

```
AUI().use('node', function(A) {
    A.all('#demo li').addClass('short');
});
```

Node queries

All the `Node` instances support `one`, `all`, and `test` methods in Alloy UI.

```
AUI().use('node', function(A) {
  var aNode = A.one('#demo');
  var bNode = aNode.one('p');
    if (bNode) {
      bNode.addClass('pear');
    }
    aNode.all('p').addClass('pear');
    if (aNode.test('.pear')) {
        aNode.removeClass('pear');
    }
});
```

`A.one('#demo')` returns `aNode`, a Node reference to the `demo` element on the page. `aNode.one('p')` gets its first child element with a `<p>` tag and returns `bNode`. If `bNode` is not null, the code applies a `pear` CSS class to the paragraph. `aNode.all('p').addClass('pear')` applies the `pear` CSS class to all the child elements of `demo` with a `<p>` tag (there is no null check here because the `all` method does not return null). `aNode.test('pear')` tests if the `demo` element has a CSS class of `pear`. If it has such a class, the code removes the class from it.

In the following sections, we will talk about some commonly used Alloy UI code. In order to run these examples, you need to include the following JavaScript files and CSS files in your JSP code:

```
<script src="../../../js/yui/yui.js" type="text/javascript"></script>
<script src="../../../js/aui-base/aui-base.js" type="text/
javascript"></script>
<link rel="stylesheet" href="../../../css/aui-skins/core/css/main.css"
type="text/css" media="screen" />
<link rel="stylesheet" href="../../../css/aui-skins/classic/
css/custom.css" type="text/css" media="screen" title="no title"
charset="utf-8" />
```

You can download these files from the Liferay site at `http://alloy.liferay.com/download.php`.

Using Ajax in Alloy UI

You may still remember Ajax calls with jQuery in *Chapter 6, Portlet User Interface*. In this section, we make Ajax calls using Alloy UI API. Let us look at some code first:

```
<% ResourceURL rURL = renderResponse.createResourceURL(); %>
// ignore details
AUI().ready('aui-io-request', function(A) {
  // ignore details
  var io = A.io.request(
    '<%= rURL.toString() %>',
  {
    autoLoad: false,
    cache: false,
    on: {
      start: function(event, id) {
        log('-');
        log(this.get('uri'));
        log('start');
      },
      success: function(event, id, xhr) {
        var data = this.get('responseData');
        var out = (dataType.val() == 'json') ? A.JSON.stringify(data)
: data;
        log('success: ' + out);
      },
      complete: function(event, id, xhr) {
        log('complete');
      },
      failure: function(event, id, xhr) {
        log('failure');
      },
      end: function(event, id) {
        log('end');
      }
    },
    after: {
      start: function() {
        log('after start');
      }
    }
  });
```

First we create a `javax.portlet.ResourceURL` object `rUrl`. We use a resource URL because we do not want to load the whole page. Ajax is used to load content for part of a page. Using a resource URL, we can load content in **Extensible Markup Language** (**XML**), HTML, **JavaScript Object Notation** (**JSON**), and text formats.

Next, we create an Ajax request instance using the `A.io.request` method. We pass in the string representation of the `javax.portlet.ResourceURL` object. We set the `autoLoad` property to `false` so that the request will not be fired immediately. It will be invoked when a **Start connection** button is clicked.

There are five possible responses from the application server—start, complete, success, failure, and end. In the previous piece of code, all the possible responses are logged.

The `this.get ('responseData')` method will return the content served by the **Application Server** (**AS**) if the response is a success.

In the code example, if we set the data type to be `html` and the response is success, we will see the **Now let us take a break** message on the screen. Here is the screenshot:

You can also submit a form to the AS with Ajax, which is an important usage of Ajax on real portal projects. You can code as follows:

```
A.io.request('your-action-url', {
  form: {
    id: 'yourFormId'
  }
});
```

This will serialize all the data in the form and send it with a request to the AS.

Plugin

A **plugin** is used to add atomic functionality or features to a host object, which can be a node, a nodelist, or a widget.

In one use case, we need to load fresh content into a `<div>` block. While the HTTP request is going to the AS fetching data, we present a waiting sign over the `<div>` block. When the content comes to the browser, we replace the waiting sign with the latest content. Here is the code for us to do this in Alloy UI:

```
<div id="content1"></div>
// ignore details
AUI().ready('aui-io-plugin', 'aui-dialog', function(A) {
  var content1 = A.one('#content1');
  content1.plug(A.Plugin.IO, {
    uri: '/snippet-portlet/jsp/snippet/views/assets/content.html',
    method: 'GET',
    data: {
      key1: 'value1',
      key2: 'value2'
    },
    on: {
      success: function(event) {
      console.log('success user', arguments);
      },
      complete: function(event) {
      },
      start: function(event) {
      },
      failure: function(event) {
      }
    }
  });
});
```

Please notice that a plugin request is also an Ajax request. So it has the five possible results with regards to the response from the AS.

By `content1.plug`, a plugin is added to the `content1` element, which is a `<div>` block. The `/snippet-portlet/jsp/snippet/views/assets/content.html` URL is used to fetch content from the AS. With the data attribute, you can specify parameter-value pairs on the URL. If the request succeeds, the fetched content will replace the waiting sign and be presented in the `content1` block.

In the example portlet (attached to this chapter), this process may happen so fast that your eyes may not catch it.

A plugin can be removed in the following way:

```
content1.unplug(A.Plugin.IO);
```

Widgets in Alloy UI

A widget is a self-contained UI unit. In this section, we will talk about a `TreeView` instance, which is a widget. The `TreeView` class extends the `TreeData` class, which in turn extends the `Base` class. The `TreeView` class provides the widget lifecycle.

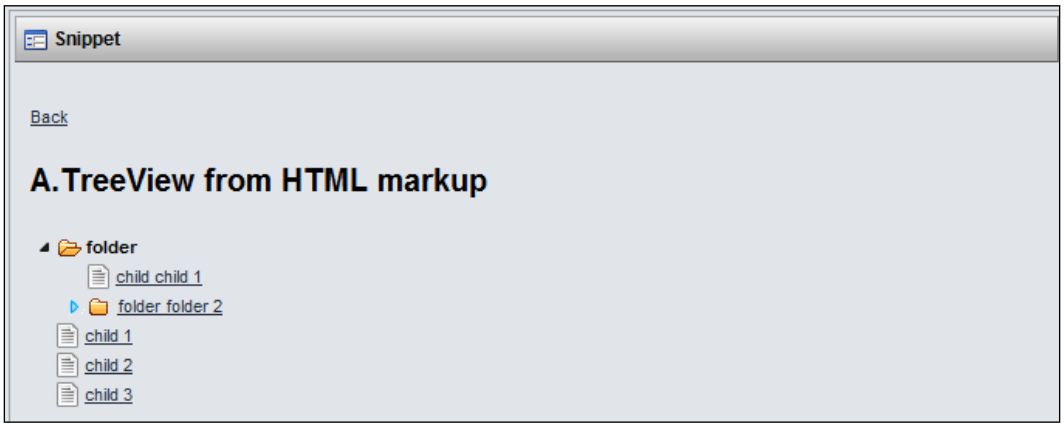
Here is the code for a `TreeView` widget:

```
<div id="markupBoundingBox">
  <ul id="markupContentBox">
    <li>
      <span>folder</span>
        <ul>
          // ignore details
  </ul>
</div>
// ignore details
AUI().ready('aui-tree-view', function(A) {
  var treeView = new A.TreeView({
    boundingBox: '#markupBoundingBox',
    contentBox: '#markupContentBox'
  }).render();
});
```

In this snippet of code, the `ready` method waits until all the DOM elements on the page are ready. It populates the sandbox with the `aui-tree-view` module and all the related files. It then calls the `function(A)` method.

The `TreeView` constructor takes a configuration object as the argument. The configuration object has a `boundingBox` attribute and a `contentBox` attribute.

When the `TreeView` instance is rendered, we get the following screen:



You can see that an expandable and collapsible directory tree is neatly presented!

How to do animation

First, we define the HTML part for the animation as follows:

```
<div id="demo" class="aui-module">
  <div class="aui-hd">
    <h4>Animation Demo</h4>
      <a href="http://www.liferay.com/" title="remove module"
class="aui-remove"><em>X</em></a>
  </div>
  <div class="aui-bd">
    <p>This an example of what you can do with the Alloy UI Animation
Utility.</p>
    <p><em>Click on the 'X' link to see the animation in action.</
em></p>
  </div>
</div>
```

In the JavaScript code, we load the `anim-base` module into the sandbox to achieve animation effect on a page.

```
AUI().use('anim-base', function(A) {
    var anim = new A.Anim({
        node: '#demo',
        to: { opacity: 0 }
    });
```

```
        var onClick = function(e) {
            e.preventDefault();
            anim.run();
        };
        A.one('#demo .aui-remove').on('click', onClick);
    });
```

First, we create an `A.Anim` instance. The constructor takes a configuration object as the argument. The configuration object contains a node that we want to animate. It also includes a `to` attribute, whose value is a property with a value. The value is the final value at the end of the animation.

The `onClick` function is a callback method that runs when the click event is fired. In our example, it is a link to an URL. So we should prevent the default reaction and run the animation instead.

Finally, we add an event listener to the `demo` element with a CSS class of `aui-remove`.

In this example, when a user clicks on the link, the box with text will fade away and disappear from the page.

This example is attached to this chapter in a `Snippet` portlet.

Drag and drop

Drag-and-drop is common in a web application. Alloy UI has a `Drag` class for implementing this feature.

```
<div id="demo_drag">Drag Me</div>
// ignore details
AUI().use('dd', 'node', function(A) {
    var dd = new A.DD.Drag({
        node: '#demo_drag'
    });
});
```

The `<div>` block with an ID of `demo_drag` is the container for the drag-and-drop instance. The previous code snippet loads `dd` and `node` modules into the sandbox first. `dd` means drag-and-drop. Then an `A.DD.Drag` object is instantiated. Its configuration object argument has a `node` attribute. Its value is the ID of the container.

Delayed task example

A delayed task delays the reaction to an event. In a use case where you enter some digits into an input box, the JavaScript code should wait for a while, confirming that you are done with the typing, and then start validating your input. This feature is useful when the delay is necessary and significant.

```
AUI().ready('aui-delayed-task', function(A) {
  var demoNode = A.get('#demo');
  var FocusTask = new A.DelayedTask(
    function() {
       this.addClass('aui-demo-hover');
    },
    demoNode
  );
  var BlurTask = new A.DelayedTask(
    function() {
      this.removeClass('aui-demo-hover', this.get('className'));
    },
    demoNode
  );
  demoNode.on('mouseover', function(event) {
    BlurTask.cancel();
    FocusTask.delay();
  });
  demoNode.on('mouseout', function(event) {
    FocusTask.cancel();
    BlurTask.delay(1000);
  });
});
```

In this example, the `A.DelayedTask` constructor takes two arguments. The first argument is a callback function that runs when the delayed task is invoked. The second argument is the scope where the delayed task is valid.

The code listens for the `mouseover` and `mouseout` events on a `demo` node (a `<div>` block in this case). When a user moves the cursor over the `demo` node, `BlurTask`, the first delayed task cancels itself immediately. `FocusTask`, the second delayed task, runs with a delay of 0 milliseconds, which adds an `aui-demo-hover` CSS class to the `demo` node. This changes the background color of the `<div>` block. For this event, there is no delay effect.

Now, the user moves the cursor out of the `<div>` block. The `FocusTask` cancels, which stops applying the `aui-demo-hover` CSS class to the `<div>` block. The `BlurTask` runs, restoring the original CSS class of the `<div>` block, but with a delay of 1,000 milliseconds. The result is, one second after the user moves the cursor away from the `<div>` block, its background changes back to its original color.

Overlay and overlay manager

An Overlay instance is a widget. It is a rectangular box with text. You can use its XY attribute to position it on a page. It has z-index support so that you can drag and drop one Overlay instance over the other.

An Overlay instance can be used to present additional information about an existing page element.

An Overlay Manager instance is used to group the overlay nodes. It controls the visibility of all overlay nodes that it has registered.

```
<div id="overlay-blue"></div>
// ignore details
AUI().ready('aui-overlay-manager', 'dd', 'node', function(A) {
  var overlay1 = new A.Overlay({
    bodyContent: 'Overlay1',
    width: 150,
    height: 150,
    xy: [ 200, 100 ]
  }).render('#overlay-blue');
  // ignore details
  var groupOverlayManager = new A.OverlayManager();
  groupOverlayManager.register([overlay1, overlay2, overlay3]);
  groupOverlayManager.hideAll();
});
```

We should populate the sandbox with the `aui-overlay-manager` module first. The `A.Overlay` constructor takes a configuration object as its argument. The `bodyContent` attribute gives the text to be shown in the overlay instance. The `xy` gives the coordinates of the overlay instance relative to its container element, which is a `<div>` block with an ID of `overlay-blue`.

The `groupOverlayManager` instance registers three overlay nodes, which includes `overlay1`. When its `hideAll` method is called, `overlay1`, `overlay2`, and `overlay3` will disappear from the page.

Image gallery

The image gallery instance of Alloy UI displays images as if in a slideshow. The focused image is put in an overlay instance. It can also show thumbnails for navigation purposes.

```
<div id="gallery1" class="gallery">
  <a href="/snippet-portlet/images/gallery/image-1.jpg" title="Image
One">
    <img class="picture" src="/snippet-portlet/images/gallery/image-
1_tn.jpg" />
  </a>
  // ignore details
</div>
// ignore details
AUI().ready('aui-image-viewer-gallery', function(A) {
  var imageGallery1 = new A.ImageGallery({
    links: '#gallery1 a',
    caption: 'Image Gallery Demo',
    paginator: {
      // maxPageLinks: 5
    },
    delay: 2000
  }).render();
});
```

It is required that the `aui-image-viewer-gallery` module be loaded into the sandbox for creating an `A.ImageGallery` instance. The `A.ImageGallery` constructor takes a configuration object as its argument. The `links` attribute is used to refer to all the images. The images are specified in the `<a>` links contained in a `<div>` block with an ID of `gallery1`. The `caption` attribute gives the title for the image gallery. The `delay` attribute gives the interval in milliseconds for image switching.

You can browse the images by clicking on the progress icon. You can also click on the play button to start the autoplay. During autoplay, an image will pause for two seconds, as specified in the previous piece of code.

At the Alloy UI site `http://alloy.liferay.com/`, there is an image gallery demo that is filled up with a warm feeling of family.

SWF file playback

This allows you to see a video playing on your webpage. The code could be very simple with Alloy UI.

```
<div class="demo" id="demo">
  Please download the Flash player to view this content.
</div>
// ignore details
AUI().ready('aui-swf', function(A) {
  var advancedSWF = new A.SWF(
    {
      boundingBox: '#demo',
      url: '/snippet-portlet/jsp/snippet/views/assets/video_landing.
swf',
      version: 9.115
    });
});
```

The `A.SWF` constructor takes a configuration object as its argument. This configuration object has three attributes. The `boundingBox` gives the ID of the container for the video to be played. The `url` gives the location to find the video file. The configuration object can still take `fixedAttributes` and `flashVars` to be passed to the `A.SWF` instance.

Other Alloy UI features

In the sample `Snippet` portlet, there is also other code that shows different Alloy UI features. These features are commonly used in web applications.

Auto-complete

People are most familiar with this feature at a search engine site. Now in Alloy UI, its code is simple.

```
<div id="autoComplete"></div>
// ignore details
AUI().use('aui-autocomplete', function(A) {
  var states = [
    ['AL', 'Alabama', 'The Heart of Dixie'],
    // ignore details
    ['WY', 'Wyoming', 'Like No Place on Earth']
  ];
```

```
var anAc = new A.AutoComplete({
    dataSource: states,
    schema: {
       resultFields: ['key', 'name', 'description']
    },
    matchKey: 'name',
    delimChar: ',',
    typeAhead: true,
    contentBox: '#autoComplete'
}).render();
```

The `states` variable is a two-dimensional array. It becomes the value for the `dataSource` attribute. We should also define the `schema` for the `dataSource` in the configuration object. The `matchKey` attribute defines that the user input should match the name column of the `dataSource`. The `contentBox` attribute specifies the container of the autocomplete feature. Here it is the `<div>` block with an ID of `autoComplete`.

Char counter

A tweet consists of up to 140 characters. The following code can be used to remind a Twitter user how many characters he has typed in so far.

```
<textarea id="tweets"></textarea>
<span id="twitterCounter"></span> character(s) remaining
// ignore details
AUI().ready('aui-char-counter', function(A) {
  var ccT = new A.CharCounter({
    input: '#tweets',
    counter: '#twitterCounter',
    maxLength: 140
  });
});
```

The previous code first loads the `aui-char-counter` module into the sandbox. It instantiates an `A.CharCounter` object. The `input` attribute gives the ID of the input field. The `counter` attribute gives the ID of the element where the number will go for the remaining characters. The `maxLength` attribute specifies the maximum number of characters a user is allowed to enter.

Resize

You can make a DOM element resizable. A user can then enlarge it for better view.

```
<textarea id="resizedField" cols="60" rows="8">Resizable input field
</textarea>
// ignore details
AUI().ready('aui-resize', function(A) {
  var resize6 = new A.Resize({
    node: '#resizedField',
    proxy: true
  });
});
```

In the previous code, the `textarea` is made resizable because its ID is passed as the value for a `node` attribute in the `A.Resize` constructor. When the value for the `proxy` attribute is `true`, we are resizing a proxy element instead of the real element.

Sortable list

You code an unordered list of items on a webpage. A user can sort the list items by drag-and-drop.

```
<div id="sortable">
  <ul>
    <li>Item A</li>
    <li>Item B</li>
    // ignore details
  </ul>
</div>
// ignore details
AUI().use('sortable', function(A) {
  var sortable = new A.Sortable({
    container: '#sortable',
    nodes: 'li',
    opacity: '.1'
  });
});
```

First the `sortable` module is loaded into the sandbox. Then an `A.Sortable` object is instantiated. The `A.Sortable` constructor takes a configuration object as its argument. The `container` attribute gives the ID of the container for the sortable list. Now the `<div>` block with an ID of `sortable` will listen for `mousedown` events. The `nodes` attribute gives the elements that are sortable. The opacity of .1 specifies that, when an element is being dragged and dropped, it is almost invisible.

Tooltip

At a Liferay portal site you may have found a question mark icon on the right-hand side of an input field. When you move the cursor over it, a hint message will show up telling you what characters are allowed in that input field. Here, we will see an updated version in Alloy UI:

```
<p>
  <a href="javascript:void(0);" id="tipOne">Tootip Demo</a>
  <br/>
  Please come to see them shooting Transformer film in Chicago on July
24, 2010.
</p>
// ignore details
AUI().ready('aui-tooltip', 'aui-io-plugin', function(A) {
  var t2 = new A.Tooltip({
    trigger: '#tipOne',
    bodyContent: '<img src="/snippet-portlet/jsp/snippet/views/assets/
cream.jpg" /><br/><div style="text-align: center;">Ice cream for
summer</div>',
  }).render();
});
```

When a user moves the cursor over the `<a>` link with an ID of `tipOne`, it will trigger the `A.Tooltip` instance. When the tooltip instance is rendered, the user will see an image with text beneath it.

Most of the mentioned code works in a `Snippet` portlet, attached to this chapter. You can experiment with this portlet in an AS of your choice.

An overview of Alloy UI modules

The following table shows a summary of Alloy UI modules (also called widgets) with name, brief description, and sample code. Most of them have been addressed in detail as mentioned earlier. Some of them don't have such details in the earlier sections. Anyway, the summary will give us a bird view for the available Alloy UI modules / widgets.

Module name	Brief description	Sample code
AutoComplete	Allows to select from a predefined list.	`AUI().use('aui-autocomplete', function(A) { window.AC = new A.AutoComplete(`
Button	Allows to give a user an action they can perform.	`AUI().ready('aui-button-item', function(A) { var labelButtons`

Module name	Brief description	Sample code
Calendar	Allows to select from a localized calendar, including multiple dates.	`AUI().ready('aui-calendar', function(A) { var calendar1 = new A.Calendar({`
Carousel	Allows to view an image gallery as a carousel.	`AUI().ready('aui-carousel', function(A) { var component = new A.Carousel(`
Chart	Allows to present numeric data in graphic ways.	`AUI().ready('aui-chart','datatype','substitute','aui-delayed-task',function(A) {`
Color-picker	You can choose colors and present their values.	`AUI().ready('aui-color-picker',function(A) {window.ColorPicker = new A.ColorPicker()`
Date-picker	Allows you to choose date and present its value.	`AUI().use('aui-datepicker', function(A) { var simpleDatepicker1 = new A.DatePicker({`
Dialog	Displays information to a user in an inline dialog that can be dragged, stacked, or presented as a modal.	`AUI().ready('aui-dialog', 'aui-overlay-manager', 'dd-constrain', function(A) {var options`
Editable	Allows for quick inline edits of content.	`AUI().ready('aui-editable',function(A) {(new A.Editable(`
Image Gallery	Allows to view an image gallery as a slideshow.	`AUI().ready('aui-image-viewer-gallery', function(A) {var imageGallery1 = new A.ImageGaller({`
Layout	A CSS Framework for robust, fluid-width layouts.	`(not applicable – only CSS code available)`
Live-search	Allows you to filter data on the fly while you search	`AUI().ready('aui-live-search', 'aui-tooltip', function(A) { var liveSearch = new A.LiveSearch({`
Loading-mask	Allows you to indicate to a user that content is still waiting to be loaded.	`AUI().ready('aui-loading-mask', function(A) { window.overlay = new A.OverlayBase({`
Nested list	A nested list.	`AUI().ready('aui-nested-list', function(A) { var nl1 = new A.NestedList({`

Module name	Brief description	Sample code
Overlay manager	Gives the ability to create arbitrary collections of overlays that can be managed in groups.	`AUI().ready('aui-overlay-manager', 'dd', 'node', function(A) {var overlay1 = new A.Overlay({`
Paginator	Enables to paginate through a data set.	`AUI().ready('aui-paginator', function(A) { var pgA = new A.Paginator({`
Panel	A generic panel that can be reused throughout an application.	`AUI().ready('aui-rating', 'aui-panel', 'anim', function(A) {var container = new A.Panel({`
Rating	Enables to rate content.	`AUI().ready('aui-rating', function(A) {var rating1 = new A.StarRating({`
Resize	Enables to resize practically any element on a page.	`AUI().ready('aui-resize',function(A) {var resize1 = new A.Resize({`
Sortable	A drag-and-drop implementation that handles sorting elements vertically or horizontally.	`AUI().ready('aui-sortable',function(A) {new A.Sortable({`
SWF	A generic utility to write SWF files to the page	`AUI().ready('aui-swf', function(A) {var simpleSWF = new A.SWF({`
Tabs	Presents information in a tabbed view, connecting content with visible items.	`AUI().ready('aui-tabs', 'substitute',function(A) {var tabs1 = new A.TabView({`
Toolbar	Allows to provide a toolbar	`AUI().ready('aui-toolbar', function(A) {var component = new A.Toolbar(`

Tree-View	A dynamic tree for drag-and-drop, AJAX requests, check boxes, and so on.	`AUI().ready('aui-tree-view', 'aui-tooltip', 'datatype-xml', 'dataschema-xml', function(A) {`
		`var fileRoot1 = new A.TreeNode({`
		`var tree1 = new A.TreeViewDD({`

Note that given summary isn't a complete list of Alloy UI modules / widgets. For more information about Alloy UI and its updates, you may refer to demo site `http://alloy.liferay.com/` or a complete list of Alloy UI modules / widgets from `svn://svn.liferay.com/repos/public/alloy/trunk/demos`.

Alloy UI contributing to YUI3

While Liferay bases its Alloy UI on YUI3, Liferay has also been contributing its custom modules to the YUI3 gallery. At the time of writing, the Alloy UI project has published the following utilities and widgets at the YUI3 site: AutoComplete, Dialog, Resize, Calendar, Image Gallery, Sortable, Charts, Paginator, Tabs, ColorPicker, Rating, TextBox List, and others.

The open source communities will benefit more from the mutual growth of Alloy UI and YUI3.

Source code

The following source code files are attached to this chapter:

- `ishop-portlet.zip`: It is for a portlet wherein the Alloy form tags are used. It is a demo for a fruit store.
- `snippet-portlet.zip`: It shows how to use Alloy UI buttons, animation, video playback, delayed task, character counting, and other Alloy UI features as have been explained in the earlier sections.

Summary

In this chapter, we have learned about Alloy UI form tags and API. From the examples we can see that:

- Alloy UI is the product of the Liferay Alloy Project
- It is aimed to achieve the goals of consistency, simplicity, and maintainability of UI
- Alloy UI is a repository of JavaScript API, CSS toolkit, and HTML
- Alloy UI uses HTML5, CSS3, and YUI3
- Alloy `form` tags have custom attributes for easy manipulation of DOM elements
- A `node` is a wrapped HTML element that has setters and getters
- A developer can specify the data type to be HTML, JSON, text, or XML in Alloy Ajax calls
- We load an `io-plugin` module in a sandbox before we use the plugin feature
- A widget is a self-contained UI piece that performs a specific functionality

In the next chapter, we will explore the UI taglib of Liferay.

9
UI Taglib

Liferay portal provides rich UI tags, and you could take advantage of these to save development time. For example, suppose that you need asset tag and categories on your custom pages, you would be able to add UI tags simply and get complex UI functions ready in a line UI tag. This chapter will address how to use UI tag libraries in the pages or portlets including CKEditor, reCAPTCHA, and others.

In this chapter, we will look at the most popular UI tags:

- Asset tag and categories
- Search container
- Custom attributes
- Tab, toggle, and calendar
- Breadcrumb, navigation, and panel
- Social activity and social bookmarks
- Discussion, ratings, diff, and flags
- Icon and input

Introduction

Liferay UI tag contains custom user interface tags, for example, error reporting, i18n, and so on. Liferay portal provides a set of UI tags, starting with `liferay-ui:*` that makes UI development fast and easy. For instance, `liferay-ui:error` shows user feedback if something goes wrong. It will be shown in the portlet, using the `portlet-msg-error` CSS class. By default, this renders a red box with the error message.

Normally, the tag `liferay-ui:error` could have optional attributes `exception`, `key`, `message`, `rowBreak`, and `translateMessage`, where the `key` must be unique. The `exception` shows the name of the `Exception` class, the `message` displays relevant message for a given key, the `rowBreak` adds row breaks in the message, and the `translateMessage` shows whether to translate the message or not.

```
<liferay-ui:success key="vote_added" message="thank-you-for-your-vote"
/>
<liferay-ui:error message="message" key="key"/>
<liferay-ui:message key="add" />
```

The tag `liferay-ui:success` shows user feedback if everything went successfully. It could have optional attributes such as `key`, `message`, and `translateMessage`. The tag `liferay-ui:message` displays a localized message for a key. The key can be one of the predefined keys from the portal core language properties or a custom key introduced with a hook, such as `Language_xx.properties`, where a set of key and value has been specified in different languages. Note that the translation doesn't support formatting. Thus, you can't add HTML into language properties file. As shown in previous snippet of code, it will display `add` translated to your selected language.

Note that when the tags `liferay-ui:success` and `liferay-ui:error` are used, the message remains on the screen until the page is navigated away. If left unattended, such stagnant data could be confused as a recent message and consequently lead to misunderstandings. The recommendation is to queue a JavaScript function to clear this information after a minute of display.

How do you properly use quotes within the tag libraries in a JSP file? For simple quotes, you can use quotes (single or double quotes) directly, as shown in the following:

```
<liferay-ui:icon image="myImage" url="<%= imageURL %>" />
```

You can also add apostrophes inside the quotes (for double quotes only):

```
<liferay-ui:icon image="myImage" message="this-is-palm's-book"
url="<%= imageURL %>" />
```

When quotes inside quotes are required, you need to add quotes (double quotes) inside quotes (single quotes), such as follows:

```
<liferay-ui:icon image="myImage" message="this-is-palm's-book"
url='<%= imageURL + "/myImageBook" %>' />
```

When quotes and apostrophes inside quotes are required, you need to separate them out into a separate Java variable as follows:

```
<%
showFullImage = "javascript: " + renderResponse.getNamespace() + "show
Image('myImageBook');"
%>
<liferay-ui:icon
  image="myImage_thumb"
  message="show-full-image-message"
  url= "<%= showFullImage %>"
/>
```

As shown in the previous code snippet, we have discussed UI tag `liferay-ui:error`, `liferay-ui:message`, and usage of quotes within tag libraries. In addition, you must add the following line to your JSP before you can start using the UI taglib tags.

```
<%@ taglib uri="http://liferay.com/tld/ui" prefix="liferay-ui" %>
```

Asset tag and category

The portal tagging system allows us to tag web content, documents, message board threads, and more, and dynamically publish assets by tags (both folksonomies and taxonomies). Tags provide a way of organizing and aggregating the content.

Folksonomy is a user-driven approach to organizing content through tags, cooperative classification, and communication through shared metadata. A tag may be associated with many assets, whereas an asset may have many tags associated with it. This is what we called **tagging content**. Also, a tag may have many properties. Each property is made up of name-value pairs.

In general, a tag may be associated with content. Using tags, you can tag almost anything—bookmarks' entries, blogs' entries, wiki articles, document library documents, image gallery images, journal articles, message board threads, and so on. You can also use these tags to pull content within the Asset Publisher portlet.

Taxonomies are hierarchical structures used in scientific classification schemes. Although taxonomies are common, it can be difficult to implement them. You can have more than one vocabulary, which forms a top-level item of the hierarchy. Each vocabulary may have many categories; that is, a category cannot be a top-level item of the hierarchy. However, a category can have other categories as its child or siblings. Therefore, vocabulary and categories form a hierarchical tree structure.

Generally, a category may have many properties. Each property is made up of a name and a value. In addition, a predefined category will be applied to any asset. In a word, assets could be managed and grouped by categories.

Settings

Let's use asset type Blogs as an example to show how to set up tags and categories based on the asset Blogs entry.

```
<aui:input name="categories" type="assetCategories" />
<aui:input name="tags" type="assetTags" />
```

As shown in the previous snippet of code, the first line shows how to select or remove categories for current asset. The second line shows how to select or remove tags for current asset and how to add new tags for current asset. Behind the scene, it uses UI tags `liferay-ui:asset-categories-selector` and `liferay-ui:asset-tags-selector` as follows:

```
<liferay-ui:asset-categories-selector
   className="<%= model.getName() %>"
   classPK="<%= _getClassPK(bean, classPK) %>"
   contentCallback='<%= portletResponse.getNamespace() +
"getSuggestionsContent" %>'
/>
<liferay-ui:asset-tags-selector
   className="<%= model.getName() %>"
   classPK="<%= _getClassPK(bean, classPK) %>"
   contentCallback='<%= portletResponse.getNamespace() +
"getSuggestionsContent" %>'
/>
```

The previous code shows how to set up a selection of tags and categories. Attributes `className`, `classPK`, `contentCallback`, `curCategoryIds`, `focus`, and `hidenInput` are options for UI tag `liferay-ui:asset-categories-selector`; while keywords `className`, `classPK`, `contentCallback`, `curTags`, `focus`, and `hidenInput` are the options for the UI tag `liferay-ui:asset-tags-selector`.

```
<span class="entry-categories">
  <liferay-ui:asset-categories-summary
    className="<%= BlogsEntry.class.getName() %>"
```

```
      classPK="<%= entry.getEntryId() %>"
      portletURL="<%= renderResponse.createRenderURL() %>"
    />
  </span>
  <span class="entry-tags">
    <liferay-ui:asset-tags-summary
      className="<%= BlogsEntry.class.getName() %>"
      classPK="<%= entry.getEntryId() %>"
      portletURL="<%= renderResponse.createRenderURL() %>"
    />
  </span>
```

The previous code shows how to display a summary of tags and categories. The attributes `className` and `classPK` are required. These two attributes identify the asset uniquely. The attributes `portletURL`, `assetTagNames` (for `liferay-ui:asset-tags-summary` only), and `message` are the options. If keyword `portletURL` is not null, it will enable tags or categories navigation. Otherwise, tags or categories navigation is disabled. As shown in following screenshot, the keyword `portletURL` was not null.

`className`: name of class of resource (for example, asset Blogs entry) to retrieve tags for
`classPK`: resource (for example, asset Blogs entry) primary key

```
<liferay-ui:asset-tags-navigation
  classNameId="<%= classNameId %>"
  displayStyle="<%= displayStyle %>"
  hidePortletWhenEmpty="<%= true %>"
  showAssetCount="<%= showAssetCount %>"
  showZeroAssetCount="<%= showZeroAssetCount %>"
/>
```

The previous code shows asset tags navigation. The attributes are `classNameId`, `displayStyle`, `hidePortletWhenEmpty`, `showAssetCount`, and `showZeroAssetCount`. When the keyword `showAssetCount` is set to `true`, the keyword `displayStyle` would have value `Number` or `Cloud`. If the keyword `displayStyle` was set as `Cloud`, then tags would be displayed as `Tags Cloud`, otherwise tags would be displayed as `Tags Navigation` with the associated assets number.

When the keyword `showAssetCount` is set to `false`, tags would be displayed as tags navigation only.

```
<c:choose>
  <c:when test="<%= allAssetVocabularies %>">
    <liferay-ui:asset-categories-navigation
      hidePortletWhenEmpty="<%= true %>"
    />
  </c:when>
  <c:otherwise>
    <liferay-ui:asset-categories-navigation
      hidePortletWhenEmpty="<%= true %>"
      vocabularyIds="<%= assetVocabularyIds %>"
    />
  </c:otherwise>
</c:choose>
```

This code shows asset categories navigation. The attributes `hidePortletWhenEmpty` and `vocabularyIds` are the options.

Configuration

You could refer to JavaScript and Taglib UI pages of tags and categories as follows:

- JavaScript for asset tags selector and asset categories selector: `$PORTAL_ROOT_HOME/html/js/liferay/asset_tags_selector.js` and `$PORTAL_ROOT_HOME/html/js/liferay/asset_categories_selector.js`
- Asset categories navigation: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_categories_navigation/page.jsp`
- Asset categories selector: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_categories_selector/page.jsp`
- Asset categories summary: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_categories_summary/page.jsp`
- Asset tags error: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_categories_error/page.jsp`
- Asset tag navigation: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_tags_navigation/page.jsp`
- Asset tag selector: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_tags_selector/page.jsp`
- Asset tag summary: `$PORTAL_ROOT_HOME/html/taglib/ui/asset_tags_summary/page.jsp`

What's happening?

The portal has the following settings by default in `portal.properties`:

```
asset.categories.properties.default=
asset.tag.properties.default=
asset.vocabulary.default=Topic
```

As shown in the preceding code, you could input a list of comma-delimited default properties for newly created categories via the property `asset.categories.properties.default`. Note that each item of the list should have the format `key:value`. You could also input a list of comma-delimited default tag properties for newly created tags via the property `asset.tag.properties.default`. Again, each item of the list should have the format `key:value`. Moreover, you could set a name, other than `Topic`, as the default vocabulary. Of course, you could override these properties in `portal-ext.properties` if required.

In addition, the portal has the following settings by default in `portal.properties`:

```
asset.filter.search.limit=5000
asset.categories.search.hierarchical=true
```

As shown in the above code, the property `asset.filter.search.limit` sets the limit for results used when performing asset searches that are subsequently filtered by permissions. The property `asset.categories.search.hierarchical` is set to `true`, thus the child categories are also included in the search. Of course, you can set it to `false` in order to specify that searching and browsing using categories should only show assets that have been assigned the selected category explicitly.

Search container

Search container provides a utility to easily paginate search results. UI tags of search container have similar format such as `liferay-ui:search*`. As shown in the following screenshot, search container includes a set of functions such as checker, order and sort, results, row, column, form, toggle, pagination, iteration, and speed, using *Users* as an example:

The portal provides a UI tag to display search results, including **OpenSearch**. In `$PORTAL_ROOT_HOME/html/portlet/search/view.jsp`, you will find the following code.

```
<liferay-ui:search />
```

Note that there is no attribute required in UI tag `liferay-ui:search`. For more details on UI tag `<liferay-ui:search>`, you can check the JSP files `start.jsp` and `end.jsp` in the folder `$PORTAL_ROOT_HOME/html/taglib/ui/search`.

UI tag

Search container is able to easily display search results with a lot of options. The following code is the snapshot for the UI tag `liferay-ui:search-container`. This is the **start-point** of the search container:

```
<liferay-ui:search-container
  rowChecker="<%= new RowChecker(renderResponse) %>"
  searchContainer="<%= new UserSearch(renderRequest, portletURL) %>"
>
```

As shown in the preceding code, all the attributes are optional, including `curParam`, `delta`, `deltaConfigurable`, `deltaParam`, `displayTerms`, `emptyResultsMessage`, `headerNames`, `hover`, `id`, `iteratorURL`, `orderByCol`, `orderByColParam`, `orderByComparator`, `orderByType`, `orderByTypeParam`, `rowChecker`, `searchContainer`, `searchTerms`, and `var`. Note that only a few attributes are present in the preceding code.

Once you have the start-point of search container, you are ready to add search container results, for example, as follows:

```
<liferay-ui:search-container-results>
  <c:choose>
   <c:when test="<%= PropsValues.USERS_SEARCH_WITH_INDEX %>">
    <%@ include file="/html/portlet/enterprise_admin/user_search_
results_index.jspf" %>
   </c:when>
   <c:otherwise>
    <%@ include file="/html/portlet/enterprise_admin/user_search_
results_database.jspf" %>
   </c:otherwise>
  </c:choose>
</liferay-ui:search-container-results>
```

As shown in the preceding code, `liferay-ui:search-container-results` was added inside `liferay-ui:search-container`. Search results would come from index (or database, as in this example). Optional attributes of `liferay-ui:search-container-results` include `results`, `resultsVar`, `total`, and `totalVar`.

After you have added search container results, you should add search container row as follows:

```
<liferay-ui:search-container-row
  className="com.liferay.portal.model.User"
  escapedModel="<%= true %>"
  keyProperty="userId"
  modelVar="user2"
>
//ignore details
</liferay-ui:search-container-row>
```

Columns

The columns should be added inside the UI tag `liferay-ui:search-container-row`. A column could be a button, a JSP page, score, or text, as `liferay-ui:search-container-column-button`, `liferay-ui:search-container-column-jsp`, `liferay-ui:search-container-column-score` or `liferay-ui:search-container-column-text`, respectively.

```
<liferay-ui:search-container-column-text
 href="<%= rowURL %>"
 name="first-name"
 orderable="<%= true %>"
 property="firstName"
/>
//ignore details
<liferay-ui:search-container-column-jsp
 align="right"
 path="/html/portlet/enterprise_admin/user_action.jsp"
/>
```

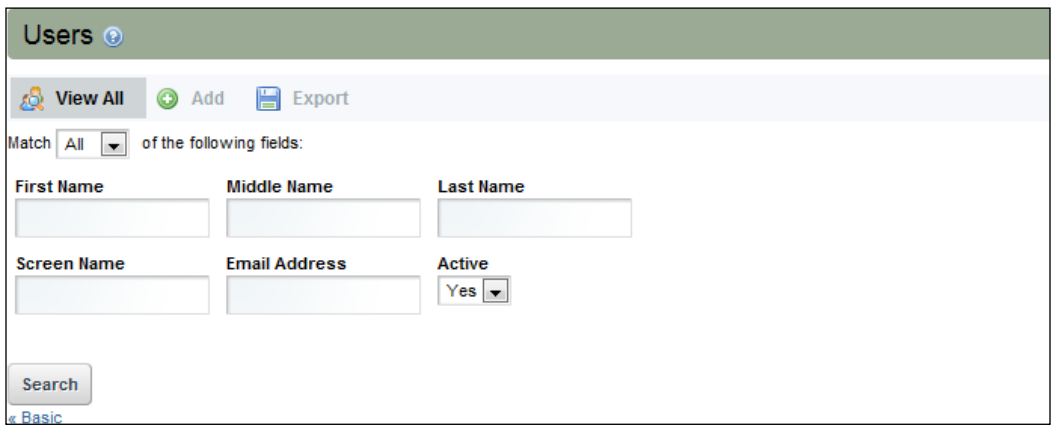
The following table shows the required attributes (with the value `True`) and optional attributes (with the value `False`) for a button, a JSP page, score, or text. Empty cell means it is not available. This means that an attribute is not available at all for a given tag. For example, the attribute `align` is not available for the tag `score`.

Attribute name	Description	text	button	jsp	score
`align`	Right-aligned	False	False	False	
`buffer`	Buffer	False			
`colspan`	Cell spans columns	False	False	False	
`href`	Page URL	False	True		
`index`	Index	False	False	False	False

Attribute name	Description	text	button	jsp	score
`name`	Name	False	False	False	False
`orderable`	Orderable	False			
`orderableProperty`	Orderable property	False			
`path`	Path			True	
`property`	Property	False			
`target`	Target	False			
`score`	Score				True
`title`	Title	False			
`translate`	Translate	False			
`valign`	Vertical-aligned	False	False	False	
`value`	Value	False			

Search form and search toggle

The UI tag search form `liferay-ui:search-form` provides a unified form for both basic search and advanced search. It always includes the UI tag search toggle `liferay-ui:search-toggle`. As shown in the following screenshot, the UI tag search toggle `liferay-ui:search-toggle` provides capability to toggle basic search form and advanced search form, where you will be able to switch between UI basic search and UI advanced search.




```
<liferay-ui:search-form
  page="/html/portlet/enterprise_admin/user_search.jsp"
/>
```

As shown in previous example code, tag attribute `page` is required, while tag attributes `searchContainer`, `servletContext` and `showAddButton` are optional.

```
<liferay-ui:search-toggle
  id="toggle_id_enterprise_admin_user_search"
  displayTerms="<%= displayTerms %>"
  buttonLabel="search"
>
<aui:fieldset>
  <aui:column>
   <aui:input name="<%= displayTerms.FIRST_NAME %>" size="20"
value="<%= displayTerms.getFirstName() %>" />
//ignore details
  </aui:column>
 </aui:fieldset>
</liferay-ui:search-toggle>
```

As shown in previous example code, tag attributes `displayTerms` and `id` are required, while tag attribute `buttonLabel` is optional.

Columns inside columns

This is in case you need to add columns inside columns. For example, you're planning to make the column **Average Rating** sort-able as shown in following screenshot.

	#	ID	Shared	Average Rating ▼	Title & Summary	Status	Views	Product Category	
☐	1.	15208		★★★★★	Testing for version 1.0 Detailed summary	NEW	10		Actions
☐	2.	15214		★★★☆☆	Testing for version 1.0 Detailed summary	NEW	4		Actions
☐	3.	15204		★☆☆☆☆	Testing artical version 1.0		15		Actions

For the previous request, you can use the **columns inside columns** approach. The following are the snapshots of the UI tag `search-container-column-text` and `liferay-ui:search-container-column-jsp`:

```
<liferay-ui:search-container-column-text
 name = "kb-article-column-average-rating"
 orderable = "<%= true %>"
>
  <liferay-ui:search-container-column-jsp
   align="left"
   path="<%= votesUrl %>"
  />
</liferay-ui:search-container-column-text>
```

Paginator

You may need to add pagination info separately in your page, thus you could use UI tag `liferay-ui:search-paginator` as follows:

```
<liferay-ui:search-paginator searchContainer="<%= searchContainer %>"
type="<%= paginationType %>" />
```

As shown in above code, the attribute `searchContainer` is required and the attribute `type` is optional, possible values would be `none`, `simple`, and `regular` (or called `more`, `article`). For example, in the portlet **Asset Publisher**, the value of pagination type would be `none`, `simple` and `regular`. `Simple` pagination type only shows links such as `Next` and/or `Previous`; while `regular` pagination type shows all links such as `Next`, `Previous`, `First`, `Last`, page number dropdown, current pages number information, and so on.

Speed and iterator

Search container provides capability to display search performance. As shown in the following screenshot, it took **0** seconds.

You would be able to get search performance message by adding UI tag `liferay-ui:search-speed` in search container as follows.

```
<liferay-ui:search-speed searchContainer="<%= searchContainer %>"
hits="<%= results %>" />
<liferay-ui:search-iterator searchContainer="<%= searchContainer %>"
/>
```

As shown in the preceding code, `liferay-ui:search-iterator` is what actually iterates through and displays the list. Attributes `paginate`, `searchContainer`, and `type` are optional. While `liferay-ui:search-speed` is what actually displays the speed info of search. Attributes `searchContainer` and `hits` are required.

Note that you should add UI tag `liferay-ui:search-iterator` before the end of search container, for example, `</liferay-ui:search-container>`; the UI tag `liferay-ui:search-speed` is normally resided before the UI tag `liferay-ui:search-iterator`.

Configuration

You could refer to JavaScript and Taglib UI pages of search container as follows:

- JavaScript for search container: `$PORTAL_ROOT_HOME/html/js/liferay/search_container.js`
- Search container and form: `$PORTAL_ROOT_HOME/html/taglib/ui/search/start.jsp,end.jsp`
- Search iterator: `$PORTAL_ROOT_HOME/html/taglib/ui/search_iterator/page.jsp`
- Search paginator: `$PORTAL_ROOT_HOME/html/taglib/ui/search_paginator/page.jsp`
- Search speed: `$PORTAL_ROOT_HOME/html/taglib/ui/search_speed/page.jsp`
- Search toggle: `$PORTAL_ROOT_HOME/html/taglib/ui/search_toggle/page.jsp`

What's happening?

Search results are displayed in pagination through the search container. Fortunately, a search container is configurable. The portal has specified the following properties in `portal.properties`:

```
search.container.page.delta.values=5,10,20,30,50,75
search.container.page.iterator.max.pages=25
```

As shown in the preceding code, the property `search.container.page.delta.values` sets the available values for the number of entries to be displayed per page. An empty value or commenting out the value will disable delta resizing. The default value of `20` will apply in all the cases. Note that you need to always include `20` because it is the default page size when no delta is specified. The absolute maximum allowed delta value is `200`.

The property `search.container.page.delta.values` sets the maximum number of pages available above and below the currently displayed page. Of course, you could override these properties anytime in `portal-ext.properties`.

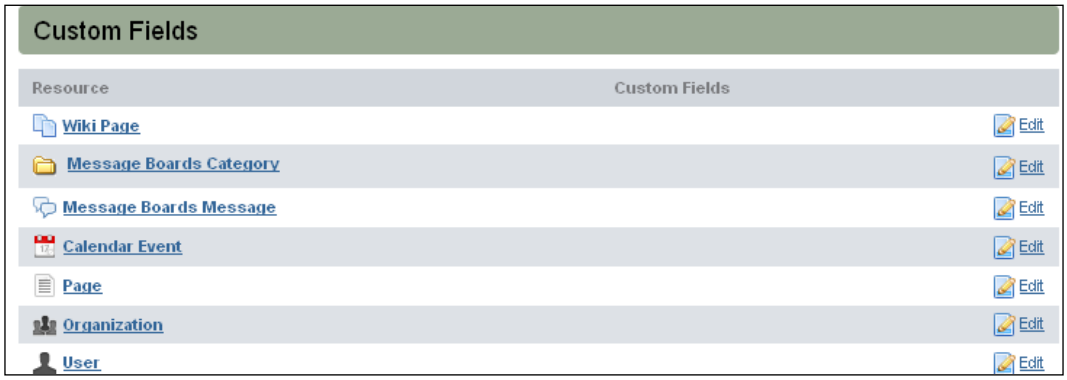
The portal has specified the following default pagination in `portal.properties`.

```
search.container.show.pagination.top=true
search.container.show.pagination.bottom=true
```

As shown in the previous code snippet, you can set the property `search.container.show.pagination.top` or the property `search.container.show.pagination.bottom` to `false` to remove the pagination controls above or below the results. Obviously, you would be able to override these properties whenever required in `portal-ext.properties`.

Custom attributes

The portal provides a framework to add custom attributes, or **custom fields**, to any Service Builder-generated entities at runtime, where indexed values, text boxes, and selection lists for input and dynamic UI are available. For example, you can add custom fields for any entity such as a **Wiki Page, Message Boards Category, Message Boards Message**, **Calendar Event, Page, Organization**, **User**, **Web Content**, **Document Library Document**, **Document Library Folder**, **Bookmarks Entry**, **Bookmarks Folder**, **Image Gallery Image**, **Image Gallery Folder**, **Blogs Entry**, and so on, and be able to add custom fields to custom entities in plugins. Refer to the following screenshot:



There are three tags related to custom attributes—`liferay-ui:custom-attribute-list`, `liferay-ui:custom-attributes-available`, and `liferay-ui:custom-attribute`.

The tag `liferay-ui:custom-attribute-list` generates a list of all the non-hidden and viewable tags for a given entity type and portal instance. The tag `liferay-ui:custom-attributes-available` and the tag `liferay-ui:custom-attribute` generates a view of a specific attribute for the given entity type and portal instance.

Settings

Liferay provides a UI taglib to allow the creation of customized attributes associated with any entity generated by Service-Builder. Obviously, these attributes provide extensibility without any need for extending the Liferay database schema. These UI tags include `liferay-ui:custom-attribute`, `liferay-ui:custom-attribute-list`, and `liferay-ui:custom-attribute-available`.

```
<liferay-ui:custom-attribute
  className="<%= className %>"
  classPK="<%= classPK %>"
  editable="<%= editable %>"
  label="<%= label %>"
  name="<%= attributeName %>"
/>
```

As shown here, the tag `liferay-ui:custom-attribute` could have required attributes such as `className`, `classPK`, and `name`; and optional attributes such as `editable` and `label` as follows:

- `className`: A fully qualified name of the entity—required: `true`. For example `com.liferay.portal.model.User`.
- `classPK`: The primary key of the entity instance (0 if there is no instance currently)—required: `true`.
- `editable`: This is an invocation to check the UPDATE permission and show as an input field if the check returns `true` —required: `false`.
- `label`: This is the label of the field rendered, if not, showing the raw output of the attribute value—required: `false`.
- `name`: The name of the specific attribute to render—required: `true`.

```
<liferay-ui:custom-attributes-available className="<%=
JournalArticle.class.getName() %>">
 <liferay-ui:custom-attribute-list
  className="<%= JournalArticle.class.getName() %>"
  classPK="<%= (article != null) ? article.getPrimaryKey() : 0 %>"
  editable="<%= true %>"
  label="<%= true %>"
 />
</liferay-ui:custom-attributes-available>
```

As shown here, the tag `liferay-ui:custom-attribute-list` could have required attributes such as `className` and `classPK` and optional attributes such as `editable` and `label`. Similarly, the tag `liferay-ui:custom-attribute-display` could have required attribute `className` and optional attribute `companyId`.

Configuration

You could refer to Taglib UI pages of custom attributes as follows.

- Tag custom attribute: `$PORTAL_ROOT_HOME/html/taglib/ui/custom_attribute/page.jsp`
- Tag custom attribute list: `$PORTAL_ROOT_HOME/html/taglib/ui/custom_attribute_list/page.jsp`

What's happening?

The **Custom Fields** framework allows us to use custom attributes (called custom fields) for any core entities of Liferay portal or any custom entities via plugins. How to add custom attribute capability? Create a `CustomAttributeDisplay` subclass and register it through `liferay-portlet.xml` as follows:

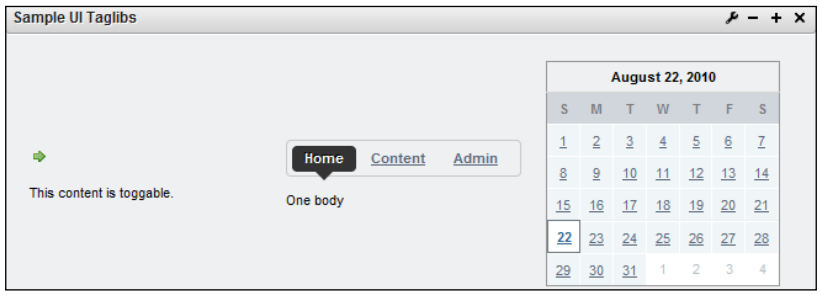
```
<custom-attributes-display>com.liferay.portlet.enterpriseadmin.
UserCustomAttributesDisplay</custom-attributes-display>
```

As shown in the previous code snippet, the `custom-attributes-display` value must be a class that implements `com.liferay.portlet.expando.model.CustomAttributesDisplay` and is called by the custom attributes administration UI.

Tabs, toggle, and calendar

You may need tabs and toggle in order to get simple and rich message in your pages; and you may need a calendar in your pages too. Thus you can simply use UI taglib like `liferay-ui:tabs`, `liferay-ui:toggle` and `liferay-ui:calendar`.

As shown in the following screenshot, it uses tag `liferay-ui:calendar` to represent a calendar view—month titles and days of the month. Of course, you can use Alloy UI option; refer to *Chapter 8, Alloy UI* for further information. Moreover, it uses tag `liferay-ui:tabs` to represent the tabs. There are three tabs in this example—**Name**, **Content**, and **Admin**. Furthermore, it uses tag `liferay-ui:toggle` to represent the toggle-able content.


Sample UI Taglibs
August 22, 2010
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4
Home
Content
Admin
This content is toggable.
One body

Using tags liferay-ui:tabs and liferay-ui:section

Tags `liferay-ui:tabs` and `liferay-ui:section` are widely used in both Liferay portal core portlets and custom portlets. The following is the sample snippet code.

```
<liferay-ui:tabs
 names="Home,Content,Admin"
 refresh="<%= false %>"
>
 <liferay-ui:section>One body</liferay-ui:section>
 //ignore details
</liferay-ui:tabs>
```

The tag `liferay-ui:tabs` has required attribute `names` and optional attributes `backLabel`, `backURL`, `formName`, `onClick`, `param`, `portletURL`, `refresh`, `tabsValue`, `url`, `url0` (1-9), and `value`. The tag `liferay-ui:section` normally represents section content of the tabs inside the tag `liferay-ui:tabs`.

Applying tags liferay-ui:toggle and liferay-ui:toggle-area

Similarly, you can apply tags `liferay-ui:toggle-area` and `liferay-ui:toogle` in both Liferay portal core portlets and custom portlets. The following is a sample snippet of code.

```
<liferay-ui:toggle-area
 id="toggle_id_communities_edit_proposal_activities"
 showMessage='<%= LanguageUtil.get(pageContext, "show-activities") + "
&raquo;" %>'
 hideMessage='<%= "&laquo; " + LanguageUtil.get(pageContext, "hide-
activities") %>'
 defaultShowContent="<%= false %>"
>
//ignore details
</liferay-ui:toggle-area>
```

As shown in the preceding code snippet, the tag `liferay-ui:toggle-area` can have optional attributes such as `align`, `defaultShowContent`, `hideImage`, `id`, `showImage`, `showMessage`, and `stateVar`.

```
<liferay-ui:toggle
 id="toggle_id_sample_ui_taglibs"
 showImage='<%= themeDisplay.getPathThemeImages() + "/arrows/01_down.
png" %>'
```

```
 hideImage='<%= themeDisplay.getPathThemeImages() + "/arrows/01_right.
png" %>'
 defaultShowContent="true"
/>
</div>
<div id="toggle_id_sample_ui_taglibs" style="display: <liferay-ui:
toggle-value id="toggle_id_sample_ui_taglibs" />; padding-top: 10px;">
This content is toggable.
</div>
```

This code snippet shows that the tag `liferay-ui:toggle` can have optional attributes such as `defaultShowContent`, `hideImage`, `id`, `showImage`, `showMessage`, and `stateVar`.

Applying the tag liferay-ui:calendar in a JSP page

You can use the tag `liferay-ui:calendar` to display simple calendar in your JSP pages. The following is the code snippet:

```
<liferay-ui:calendar
 month="<%= curMonth %>"
 day="<%= curDay %>"
 year="<%= curYear %>"
 headerFormat="<%= dateFormatDate %>"
 data="<%= data %>"
/>
```

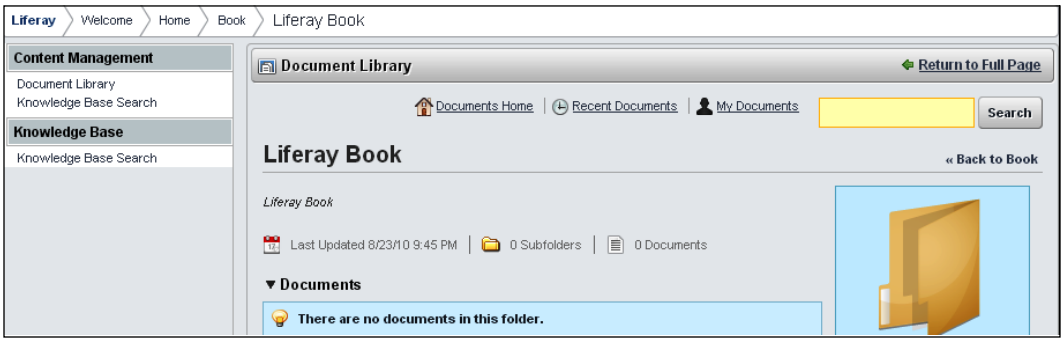
The tag `liferay-ui:calendar` should have *required* attributes such as `day`, `month`, and `year`, and optional attributes such as `data`, `headerFormat`, `headerPattern`, and `showAllPotentialWeeks`.

Fortunately, you could refer to Taglib UI pages of tabs, toggle, and calendar as follows:

- Tag tabs: `$PORTAL_ROOT_HOME/html/taglib/ui/tabs/page.jsp`
- Tag toggle: `$PORTAL_ROOT_HOME/html/taglib/ui/toggle/page.jsp`
- Tag toggle area: `$PORTAL_ROOT_HOME/html/taglib/ui/toggle-area/page.jsp`
- Tag calendar: `$PORTAL_ROOT_HOME/html/taglib/ui/calendar/page.jsp`

Breadcrumb, navigation, and panel

As shown in following screenshot, the tag `liferay-ui:breadcrumb` could be used to display a trail of parent pages and folders for the current folder of the **Document Library**. The tag `liferay-ui:navigation` could be used to display a directory of links reflecting page structure. In addition, you would be able to add a panel by the tag `liferay-ui:panel`.



Settings

The tag `liferay-ui:breadcrumb` displays a series of links representing page hierarchy. It will display links or text depending on the `displayStyle` parameter.

```
<liferay-ui:breadcrumb showGuestGroup="<%= false %>"
showParentGroups="<%= false %>" showLayout="<%= false %>" />
```

As shown in this code, the tag `liferay-ui:breadcrumb` can have optional attributes such as `displayStyle` (`1` represents the links to the pages in the child-parent hierarchy, `2` represents text but no links), `portletURL`, `selLayout`, `selLayoutParam`, `showGuestGroup`, `showLayout`, `showParentGroups`, `showPortletBreadCrumb`, and `showPortletBreadcrumb`.

```
<liferay-ui:panel-floating-container id="groupSelectorPanel"
paging="<%= true %>" trigger=".lfr-group-selector">
 <liferay-ui:panel collapsible="<%= true %>" extended="<%= true
%>" id="communitiesPanel" persistState="<%= true %>" title='<%=
LanguageUtil.get(pageContext, "communities") %>'>
 </liferay-ui:panel>
 //ignore details
</liferay-ui:panel-floating-container>
```

As shown in the previous code snippet, the tag `liferay-ui:panel-floating-container` could have required attribute `trigger` and optional attributes such as `accordion`, `cssClass`, `extended`, `id`, `paging`, `pagingElements`, `persistStage`, and `width`.

```
<liferay-ui:panel-container extended="<%= true %>" id="sessionHistoryP
anelContainer" persistState="<%= true %>">
 <liferay-ui:panel collapsible="<%= true %>" extended="<%= false %>"
id="sessionAccessedURLsPanels" persistState="<%= true %>" title='<%=
LanguageUtil.get(pageContext, "accessed-urls") %>'>
 </liferay-ui:panel>
 //ignore details
</liferay-ui:panel-container>
```

As shown in the previous code snippet, the tag `liferay-ui:panel-container` could have optional attributes such as `accordion`, `cssClass`, `extended`, `id`, and `persistStage`. As you can see, the tag `liferay-ui:panel` could have required attribute `title` and optional attributes such as `collapsible`, `cssClass`, `defaultState`, `extended`, `id`, and `persistStage`. Note that the tag `liferay-ui:panel` always stays inside the tags `liferay-ui:panel-container` and `liferay-ui:panel-floating-container`.

The tag `liferay-ui:navigation` displays a directory of links reflecting the page structure. The following is a sample snippet:

```
<liferay-ui:navigation
 bulletStyle="<%= bulletStyle %>"
 displayStyle="<%= displayStyle %>"
 headerType="<%= headerType %>"
 rootLayoutType="<%= rootLayoutType %>"
 rootLayoutLevel="<%= rootLayoutLevel %>"
 includedLayouts="<%= includedLayouts %>"
 nestedChildren="<%= nestedChildren %>"
/>
```

The preceding code shows that the tag `liferay-ui:navigation` can have a set of optional attributes such as `bulletStyle`, `displayStyle`, `headerType`, `includedLayouts`, `nestedChildren`, `rootLayoutLevel`, and `rootLayoutType`. `BulletStyle` can have values `1` and `2`, while `displayStyle` could be `1`, `2`, `3`, `4`, `5`, and `6` in `portal.properties`, as shown as follows:

```
navigation.display.style.options=1,2,3,4,5,6
navigation.display.style[1]=breadcrumb,relative,0,auto,true
navigation.display.style[2]=root-layout,absolute,2,auto,true
navigation.display.style[3]=root-layout,absolute,1,auto,true
```

```
navigation.display.style[4]=none,absolute,1,auto,true
navigation.display.style[5]=none,absolute,1,all,true
navigation.display.style[6]=none,absolute,0,auto,true
```

As show in the previous code, the portlet defines each mode that represents the form—`headerType`, `rootLayoutType`, `rootLayoutLevel`, `includedLayouts`, and `nestedChildren`. Within these styles, you can easily modify the look and the feel of the portlet without changing the JSP.

Configuration

Of course, you could refer to Taglib UI pages of navigation, breadcrumb, and panel as follows:

- JavaScript for navigation: `$PORTAL_ROOT_HOME/html/js/Liferay/navigation.js`
- JavaScript for panel and panel floating container: `$PORTAL_ROOT_HOME/html/js/Liferay/panel.js, panel_floating.js`
- Tag breadcrumb: `$PORTAL_ROOT_HOME/html/taglib/ui/breadcrumb/page.jsp, display_style_1.jsp, display_style_2.jsp`
- Tag panel container: `$PORTAL_ROOT_HOME/html/taglib/ui/panel_container/start.jsp, end.jsp`
- Tag panel floating_container: `$PORTAL_ROOT_HOME/html/taglib/ui/panel_floating_container/start.jsp, end.jsp`
- Tag panel: `$PORTAL_ROOT_HOME/html/taglib/ui/panel/start.jsp, end.jsp`

Social activity and social bookmarks

You would be able to add social activity tracking to a portlet via the tag `liferay-ui:social-activities`, and moreover, you can add social bookmarks in a portlet through the tag `liferay-ui:social-bookmarks`.

Settings

Social activities could be displayed through the tag `liferay-ui:social-activities` as follows:

```
<liferay-ui:social-activities
 activities="<%= activities %>"
 feedEnabled="<%= true %>"
```

```
 feedTitle="<%= HtmlUtil.escape(taglibFeedTitle) %>"
 feedLink="<%= rssURL.toString() %>"
 feedLinkMessage="<%= HtmlUtil.escape(taglibFeedLinkMessage) %>"
/>
```

As shown in the preceding code, the tag `liferay-ui:social-activities` could have optional attributes such as `activities`, `className`, `classPK`, `feedEnabled`, `feedLink`, `feelLinkMessage`, and `feedTitle`.

```
<liferay-ui:social-bookmarks
 url="<%= bookmarkURL.toString() %>"
 title="<%= entry.getTitle() %>"
 target="_blank"
/>
```

This code shows that the tag `liferay-ui:social-bookmarks` could have required attributes such as `title` and `url` and optional attributes such as `target` and `types`. By the way, you could use the tag `liferay-ui:social-bookmarks` to add social bookmarks in your pages too. The tag `liferay-ui:social-bookmark` could have the required attributes `title`, `type`, and `url` and an optional attribute such as `target`.

Configuration

You may be interested to refer to Taglib UI pages of social activities, social bookmark, and social bookmarks as follows:

- Tag social activities: `$PORTAL_ROOT_HOME/html/taglib/ui/social_activities/page.jsp`
- Tag social bookmark: `$PORTAL_ROOT_HOME/html/taglib/ui/social_bookmark/page.jsp`
- Tag social bookmarks: `$PORTAL_ROOT_HOME/html/taglib/ui/social_bookmarks/page.jsp`

What's happening?

As you will have noticed, the portal that already provided the tag `social-activity-interpreter-class` value must be a class that implements `com.liferay.portlet.social.model.SocialActivityInterpreter` and it is called to interpret the activities into friendly messages that are easily understandable by a human being.

The tag `social-activity-interpreter-class` adds social activity tracking to a portlet, and recorded social activities will appear on the Activities portlet. For example, blog entries would be displayed as recorded social activities in the Activities portlet, as the portlet Blogs supports social activities recorded as follows in `$PORTAL_ROOT_HOME/WEB-INF/liferay-portlet.xml`.

```
<social-activity-interpreter-class>com.liferay.portlet.blogs.
social.BlogsActivityInterpreter</social-activity-interpreter-
class>
```

Discussion, ratings, diff, and flags

Ranking a page or portlet could be used to measure popularity. Fortunately, the portal provides a page-rating portlet, and this can be added to any page. In addition, adding ranking to a portlet can be done with the tag `liferay-ui:rating`, as the portal provides a way of extending portlet capabilities via the UI tags.

Adding comments on a page or an asset could be useful too. The portal provides a page comments portlet, and this can be added to any page. Actually, adding comments to a portlet or any asset can be done with the tag `liferay-ui:discussion` by extending portlet capabilities via UI tags.

Settings

As you will have noticed, comments and ratings could be attached to any assets generated by the Service-Builder, either in a portal core or in custom plugins. The attributes `className` and `classPK` are used to represent these assets, as shown in the following snippet:

```
<liferay-ui:discussion
 className="<%= WorkflowInstance.class.getName() %>"
 classPK="<%= workflowTask.getWorkflowInstanceId() %>"
```

```
 formAction="<%= discussionURL %>"
 formName="fm1"
 ratingsEnabled="<%= false %>"
 redirect="<%= currentURL %>"
 subject="<%= LanguageUtil.get(pageContext, workflowTask.getName())
%>"
 userId="<%= user.getUserId() %>"
/>
```

The tag `liferay-ui:discussion` should have required attributes such as `className`, `classPK`, `formAction`, `subject`, and `userId`, and optional attributes such as `formName`, `permissionClassName`, `permissionClassPK`, `ratingsEnabled`, and `redirect`. Here, the attributes `className` and `classPK` are used to represent any assets generated by the Service-Builder in a portal core or custom plugins.

```
<liferay-ui:ratings-score score="<%= score %>" />
<liferay-ui:ratings
className="<%= WikiPage.class.getName() %>"
classPK="<%= wikiPage.getResourcePrimKey() %>"
url='<%= themeDisplay.getPathMain() + "/wiki/rate_wiki" %>'
/>
```

The tag `liferay-ui:ratings-score` could have only one required attribute `score`, while the tag `liferay-ui:ratings` could have multiple required attributes such as `className` and `classPK` and optional attributes such as `numberOfStars`, `ratingsEntry`, `ratingsStars`, `type`, and `url`. The value of `type` could be `thumbs` or `stars`. For the `stars` type, you can specify the number of stars, such as `5` or `10`.

You may be required to display differences by comparing the source ad target. In this case, you can leverage tags `liferay-ui:diff` and / or `liferay-ui:diff-html` in your pages or portlets. The tag `liferay-ui:diff` should be used to compare the text-based content, while the tag `liferay-ui:diff-html` can be used to compare the html-based content.

```
<liferay-ui:diff
 diffResults="<%= diffResults %>"
 sourceName="<%= sourceName %>"
 targetName="<%= targetName %>"
/>
```

As shown in the preceding code, the tag `liferay-ui:diff` would have required attributes `diffHtmlResults`, `sourceName` and `targetName`. There is no optional attribute at all.

```
<liferay-ui:diff-html
 diffHtmlResults="<%= diffHtmlResults %>"
/>
```

As shown in the previous code, the tag `liferay-ui:diff-html` will have the required attribute `diffHtmlResults`.

The portal provides a framework so that the portlets or pages can allow the users to flag content as inappropriate and send an e-mail to the administrators with this information. This has been applied to the core portlets such as Blogs and Message Boards, which will display a red flag icon to allow the user to flag their blog entries or posts by specifying a reason for doing it optionally. Guest users can be enabled through the properties to the flag content. Of course, you can add flagging capability on any content of custom plugins portlets as well.

You may flag content from both portal core portlets and custom plugins portlets as inappropriate, that is, report abuse, via the tag `liferay-ui:flags` as follows:

```
<liferay-ui:flags
 className="<%= assetEntry.getClassName() %>"
 classPK="<%= assetEntry.getClassPK() %>"
 contentTitle="<%= assetRenderer.getTitle() %>"
 reportedUserId="<%= assetRenderer.getUserId() %>"
/>
```

As shown in the previous code snippet, the tag `liferay-ui:flags` will have required attributes such as `className`, `classPK`, and `contentTitle` and optional attributes such as `message` and `reportedUserId`.

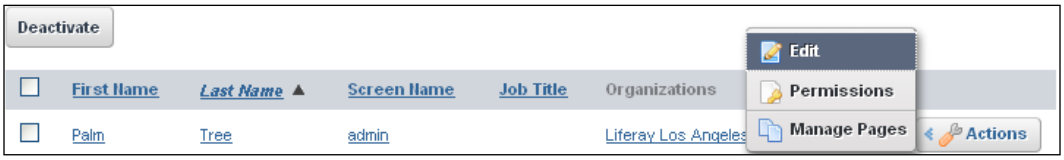
Configuration

The following are Taglib UI pages of discussions, ratings, diff, and flags:

- Tag discussion: `$PORTAL_ROOT_HOME/html/taglib/ui/discussion/page.jsp, view_message_thread.jsp`
- Tag ratings: `$PORTAL_ROOT_HOME/html/taglib/ui/ratings/page.jsp`
- Tag ratings score: `$PORTAL_ROOT_HOME/html/taglib/ui/ratings_score/page.jsp`
- Tag diff: `$PORTAL_ROOT_HOME/html/taglib/ui/diff/page.jsp`
- Tag diff html: `$PORTAL_ROOT_HOME/html/taglib/ui/diff_html/page.jsp`
- Tag flags: `$PORTAL_ROOT_HOME/html/taglib/ui/flags/page.jsp`

Icon and input

In your pages or portlets, you may need a lot of icons and input forms. Thus, you can leverage UI taglib `liferay-ui:icon*` and `lifray-ui:input*`. The following screenshot displays the look and feel of tags `liferay-ui:icon-menu`, `liferay-ui:icon`, `liferay-ui:icon-delete`, and `liferay-ui:icon-deactivate`.



Tag icon settings

The following snippet shows how to add tags `liferay-ui:icon-menu`, `liferay-ui:icon`, `liferay-ui:icon-deactivate`, `liferay-ui:icon-delete`, and `liferay-ui:icon-help` in your pages or portlets.

```
<liferay-ui:icon-menu>
<liferay-ui:icon image="edit" label="true" message="change" url="<%=
editURL %>" />
<liferay-ui:icon-deactivate url="<%= deleteUserURL %>" />
<liferay-ui:icon-delete url="<%= deleteURL %>" />
<liferay-ui:icon-help
message="properties-are-a-way-to-add-more-detailed-information-to-a-
specific-category" />
</liferay-ui:icon-menu>
```

As shown in the preceding code snippet, you will be able to configure optional attributes for the tag `liferay-ui:icon-menu`, for example, `align`, `cssClass`, `icon`, `id`, `message`, `showExpanded`, `showArrow`, and `showWhenSingleIcon`. Meanwhile, you would be able to set up optional attributes such as `cssClass`, `id`, `image`, `imageHover`, `label`, `lang`, `message`, `method`, `src`, `srcHover`, `target`, `toolTip`, and `url` on the tag `liferay-ui:icon`, too. Similarly, tags `liferay-ui:icon-deactivate` and `liferay-ui:icon-delete` could have non-required attributes `label` and `help`, and the tag `liferay-ui:icon-help` could have non-required attribute `message`.

Where is the image "edit" located? The image is located in the theme folder `$PORTAL_ROOT_HOME/html/themes/classic/images/common`. These images are automatically populated into the theme by their names such as `add`, `activate`, and so on. To add or customize your own icon to work with this tag, it must first have a PNG file in the `/docroot/_diffs/images/common` of your own theme. Refer to the following code:

```
<liferay-ui:icon-list>
<liferay-ui:icon
image='<%= "../file_system/small/" + extension %>'
label="<%= true %>"
message='<%= LanguageUtil.format(pageContext, "x-convert-x-to-x", new
Object[] {"aui-helper-hidden-accessible", assetRenderer.getTitle(),
extension.toUpperCase()}) %>'
method="get"
url="<%= exportAssetURL.toString() %>"
/>
</liferay-ui:icon-list>
```

As shown in preceding code, you would be able to configure optional attribute for the tag `liferay-ui:icon-list`, for example, `showWhenSingleIcon`.

Tag input settings

As mentioned earlier, you may need a set of UI taglib `lifray-ui:input*` in your pages or portlets. The following table shows more details about tags `lifray-ui:input*`. You can use one or many of them in your own pages, whenever it may be required.

Name	Tag	Sample code	Attributes
input check box	`liferay-ui:input-checkbox`	`<liferay-ui:input-checkbox param="hidden" defaultValue="<%= hidden %>" />`	`cssClass, defaultValue, disabled, formName, id, onClick,` `required - param`

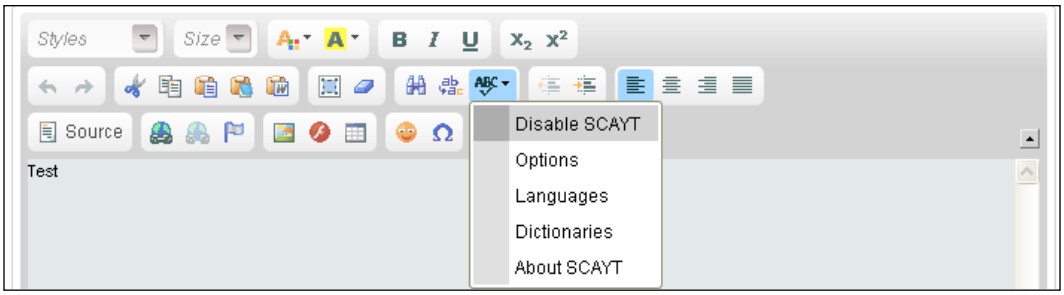
input date	`liferay-ui:input-date`	`<liferay-ui:input-date`
		`yearRangeStart="<%= yesterday.get(Calendar.YEAR) - 100 %>"`
		`yearRangeEnd="<%= yesterday.get(Calendar.YEAR) %>"`
		`/>`
			`cssClass, dayNullable, dayParam, dayValue,disableNamespace, disable, firstDayOfWeek, forName, imageInputId, monthAndYearNullable, monthAndYearParam, monthNullable, monthParam, monthValue, yearNullable, yearParam, yearvalue,`
			`Required- yearRangeEnd yearRangeStar`

Name	Tag	Sample code	Attributes
input editor	liferay-ui: input-editor	<liferay-ui:input-editor editorImpl="<%= EDITOR_WYSIWYG_IMPL_KEY %>" />	cssClass, editorImpl, height, initMethod,name, onChangeMethod, toolbarSet, width
input field	liferay-ui: input-field	<liferay-ui:input-field model="<%= SCFrameworkVersion.class %>" bean="<%= frameworkVersion %>" field="url" />	Bean, cssClass, defaultValue, disable, fieldParam, formName Required – field, model
input localized	liferay-ui:input-localized	<liferay-ui: input-localized name="title" xml='<%= BeanPropertiesUtil.getString(workflowDefinition, "title") %>' />	cssClass, disabled, type required – name, type
input move boxes	liferay-ui: input-move-boxes	<liferay-ui:input-move-boxes leftTitle="current" rightTitle="available" leftBoxName="currentAssetVocabularyIds" rightBoxName="availableAssetVocabularyIds" leftList="<%= typesLeftList %>" rightList="<%= typesRightList %>" />	cssClass, leftOnChange, leftReorder, rightOnChange, rightReorder Required – leftBoxName, leftList, leftTitle, rightBoxName, rightList, rightTitle
input permissions	liferay-ui:input-permissions	<liferay-ui:input-permissions modelName="<%= AssetCategory.class.getName() %>" />	forName, modelName

Name	Tag	Sample code	Attributes
input permissions params	liferay-ui:input-permissions-params	<liferay-ui:input-permissions-params modelName="<%= DLFileEntry.class.getName() %>" />	modelName
input repeat	liferay-ui:input-repeat	<liferay-ui:input-repeat event="<%= event %>" />	cssClass, event
input resource	liferay-ui:input-resource	<liferay-ui:input-resource url="<%= webDavUrl %>" />	cssClass, url
input scheduler	liferay-ui:input-scheduler	<liferay-ui:input-scheduler />	(none)
input select	liferay-ui:input-select	<liferay-ui:input-select param="<%= tab2 %>"/>	cssClass, defaultvalue, disable, formName Required - param
input text area	liferay-ui:input-textarea	<liferay-ui:input-textarea param="<%= tab2 %>"/>	cssClass, defaultvalue, disable, formName Required - param
input time	liferay-ui:input-time	<liferay-ui:input-time amPmParam='<%= "startDateAmPm" %>' hourParam='<%= "startDateHour" %>' minuteParam='<%= "startDateMinute" %>' />	amPmNullable, amPmvalue, cssClass, disabled, hourNullable, hourValue, minuteInterval, minuteNullable, minuteValue, Required - amPmParam,hourParam, minuteParam
input time zone	liferay-ui:input-time-zone	<liferay-ui:input-time-zone name="<%= name %>" />	cssClass, daylight, disabled, displayStyle, nullable, value required - name

CKEditor

The portal provides full integration with CKEditor, as shown in following screenshot. CKEditor inherits the quality and strong features people were used to finding in FCKeditor, in a much more modern product, added by dozens of new benefits, such as accessibility and ultimate performance. CKEditor supports standards such as W3C (WAI-AA and WCAG 2.0), 508 (Section 508). Web accessibility is now a reality with the help of CKEditor at `http://ckeditor.com/`.



Settings

Spell Check As You Type (**SCAYT**) is supported in CKEditor, allowing the user to see and correct the misspellings while typing. The misspelled words are underlined. The user just needs to right-click the marked word and select a suggestion to replace it with.

How to enable CKEditor SCAYT in Liferay toolbar as shown in the previous screenshot? It is very simple to use SCAYT and CKEditor in Liferay portal 6. The following are simple steps to bring SCAYT into CKEditor:

1. Locate the folder `$PORTAL_ROOT_HOME/html/js/editor/ckeditor`.
2. Open the JSP file `ckconfig.jsp`.
3. Add the following updates for `CKEDITOR.config.toolbar_liferay` and save it:

```
CKEDITOR.config.toolbar_liferay = [
 ['Styles', 'FontSize', '-', 'TextColor', 'BGColor'],
 ['Bold', 'Italic', 'Underline', 'StrikeThrough'],
 ['Subscript', 'Superscript'],
 '/',
 ['Undo', 'Redo', '-', 'Cut', 'Copy', 'Paste', 'PasteText',
'PasteFromWord', '-', 'SelectAll', 'RemoveFormat'],
 ['Find', 'Replace', 'SpellChecker', 'Scayt'],
 ['OrderedList', 'UnorderedList', '-', 'Outdent', 'Indent'],
```

```
 ['JustifyLeft', 'JustifyCenter', 'JustifyRight', 'JustifyBlock'],
 '/',
 ['Source'],
 ['Link', 'Unlink', 'Anchor'],
 ['Image', 'Flash', 'Table', '-', 'Smiley', 'SpecialChar']
];
```

4. Click on the CKEditor button **Scayt** to enable SCAYT—Spell Check as You Type.

In the same way, you will be able to enable CKEditor SCAYT in the Liferay article toolbar (that is, `CKEDITOR.config.toolbar_liferayArticle`), edit-in-place toolbar (`CKEDITOR.config.toolbar_editInPlace`), and e-mail toolbar (that is, `CKEDITOR.config.toolbar_email`) in the JSP file `ckconfig.jsp`.

What's happening?

The portal has specified the following settings related to the WYSIWYG editor in `portal.properties`:

```
editor.wysiwyg.default=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.blogs.edit_entry.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.calendar.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.enterprise_admin.view.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.invitation.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_article_
content.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_article_
content_xsd_el.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.journal.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.login.configuration.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.mail.edit.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.mail.edit_message.
jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.message_boards.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.shopping.edit_
configuration.jsp=ckeditor
editor.wysiwyg.portal-web.docroot.html.portlet.wiki.edit.html.
jsp=ckeditor
```

As shown in preceding code, the default WYSIWYG editor is CKEditor. This WYSIWYG editor is included in the edit page of blog entries, web content, wiki pages, mail configuration, and so on. Of course, you would be able to use other WYSIWYG editors such as `fckeditor`, `liferay`, `simple`, `tinymce`, or `tinymcesimple`.

How to add a WYSIWYG editor to a portlet? As mentioned in the previous table, you could use the UI taglib `liferay-ui:input-editor` with Alloy UI tag and script in your pages or portlets, for example, Knowledge Base portlets.

```
<aui:field-wrapper label="content">
  <liferay-ui:input-editor width="100%" />
  <aui:input name="content" type="hidden" />
</aui:field-wrapper>
//ignore details
<aui:script>function <portlet:namespace />initEditor() {
  return "<%= UnicodeFormatter.toString(content) %>"; }
</aui:script>
```

Configuration

The following are Taglib UI pages of `input` and `icon`.

- Tag `icon*`: `$PORTAL_ROOT_HOME/html/taglib/ui/icon*/page.jsp, view_message_thread.jsp`
- Tag `input*`: `$PORTAL_ROOT_HOME/html/taglib/ui/input*/page.jsp`

Many other useful UI tags

Furthermore, you would like to use more UI taglib in your portlets such as captcha, flash, group search, user display, user search, and header, as shown in the following table. Note that the tag `liferay-ui:captcha` is going to display CAPTCHA by default or reCAPTCHA when reCAPTCHA is enabled in **Control Panel** | **Server Administration** | **CAPTCHA** and both public key and private key are provided as well.

Name	Tag	Sample code	Attributes
captcha	liferay-ui:captcha	<liferay-ui:captcha url="<%= captchaURL %>" />	required - url
flash	liferay-ui:flash	<liferay-ui:flash allowFullScreen="true" allowScriptAccess="true" height="<%= height %>" movie='<%= _SWF_URL + "?" + sb.toString() %>' width="<%= width %>" wmode="opaque" />	align, allowFullScreen, allowScriptAccess, base, bgcolor, devicefont, flashvars,height, id, loop, menu, play, quality, salign, scale, swliverconnect, version, width, wmode required - movie
group search	liferay-ui:group-search	<liferay-ui:group-search portletURL="<%= portletURL %>" rowChecker="<%= rowChecker %>" userParams="<%= userParams %>" />	Required - groupParems, portletURL, rowChecker
user display	liferay-ui:user-display	<liferay-ui:user-display userId="<%= socialRequest.getUserId() %>" displayStyle="<%= 2 %>" />	displayStyle, url, username required - userId
user search	liferay-ui:user-search	<liferay-ui:user-search portletURL="<%= portletURL %>" rowChecker="<%= rowChecker %>" userParams="<%= userParams %>" />	rowChecker, required – portletURL, userParams
header	liferay-ui:header	<liferay-ui:header backURL="<%= redirect %>" title='<%= (company2 == null) ? "new-portal-instance" : company2.getName() %>' />	backLabel, backURL, cssClass, required - title

In the same way, you would like to use the following UI taglib in your portlets: `journal article`, `journal article search`, `language`, `my places`, and `page iterator`.

Name	Tag	Sample code	Attributes
journal article	`liferay-ui: journal-article`	`<liferay-ui:journal-article groupId="<%= PropsValues.TERMS_OF_USE_JOURNAL_ARTICLE_GROUP_ID %>" articleId="<%= PropsValues.TERMS_OF_USE_JOURNAL_ARTICLE_ID %>" />`	`articleId, articlePage, articleResourcePrimkey, groupId, languageId, showAvailableLocale, showTitle, templateId, xmlRequest`
journal article search	`liferay-ui: journal-content-search`	`<liferay-ui:journal-content-search />`	
language	`liferay-ui: language`	`<liferay-ui:language languageIds="<%= availableLocales %>" displayStyle="<%= 0 %>" />`	`Required - url`
my places	`liferay-ui:my-places`	`<liferay-ui:my-places />`	`Max`

page iterator	`liferay-ui:page-iterator`	`<liferay-ui:page-iterator`
		`cur="<%= articleDisplay.getCurrentPage() %>"`
		`curParam='<%= "page" %>'`
		`delta="<%= 1 %>"`
		`maxPages="<%= 25 %>"`
		`total="<%= articleDisplay.getNumberOfPages() %>"`
		`type="article"`
		`url="<%= portletURL.toString() %>"`
		`/>`
			`delta, deltaConfigurable, deltaParam, formName, jsCall, maxPages, target, total, type, url`
			`required - cur, curParam`

In addition, you could use the following UI taglib in your custom portlets—`param`, `png-image`, `staging`, `table iterator`, `upload process`, `webdev`, and `write`.

Name	Tag	Sample code	Attributes
param	liferay-ui:param	<liferay-ui:param name="type" value="<%= type %>" />	required – url, name
png image	liferay-ui:png-image	<liferay-ui:png-image image='<%= themeDisplay.getPathThemeImage() + "/icons_nav_main.png" %>' height="50" width="50" />	required - height image, width
staging	liferay-ui:staging	<liferay-ui:staging />	
table iterator	liferay-ui:table-iterator	<liferay-ui:table-iterator list="<%= calendars %>" listType="java.util.Calendar" rowLength="3" rowPadding="30" rowValign="top" >	bodyPage, rowBreak, rowLength(required), rowPadding, rowValign, width required – list, listType
upload process	liferay-ui:upload-progress	<liferay-ui:upload-progress id="<%= uploadProgressId %>" message="uploading" redirect="<%= redirect %>" />	Id, iframeSrc, message, redirect
webdav	liferay-ui:webdav	<liferay-ui:webdav path='<%= "/image_gallery" + sb.toString() %>' />	path
write	liferay-ui:write	<liferay-ui:write bean="<%= user2 %>" property="organizations" />	required-bean, property

Configuration

You may be interested to refer to JavaScript language and upload process, as shown as follows:

- JavaScript language: `$PORTAL_ROOT_HOME/html/js/Liferay/language.js`
- JavaScript upload process: `$PORTAL_ROOT_HOME/html/js/Liferay/upload_process.js`

Furthermore, all the UI taglib page specifications are available at `$PORTAL_ROOT_HOME/html/taglib/ui`. You may use them as a reference. Of course, you can get the UI taglib details, that is, **Tag Library Descriptors** (**TLD**), in the `$PORTAL_ROOT_HOME/WEB-INF/tld/liferay-ui.tld` file.

Special sound UI reCAPTCHA

Liferay supports special sound UI reCAPTCHA. reCAPTCHA is a Google service that generates CAPTCHAs. In general, reCAPTCHA is a free, secure, and accessible CAPTCHA, with an audio alternative when users can't interpret images.

Of course, you can quickly enable the reCAPTCHA via **Control Panel** | **Server Administration** | **Captcha** by providing public key and private key. After that, it is ready for you to use the reCAPTCHA when creating an account, as shown in following screenshot:

What's happening?

The portal has specified a set of properties related to reCaptcha in `portal.properties`.

```
captcha.check.portal.create_account=true
captcha.check.portal.send_password=true
captcha.check.portlet.message_boards.edit_category=false
captcha.check.portlet.message_boards.edit_message=false
```

```
#captcha.engine.impl=com.liferay.portal.captcha.recaptcha.
ReCaptchaImpl
captcha.engine.impl=com.liferay.portal.captcha.simplecaptcha.
SimpleCaptchaImpl
captcha.engine.recaptcha.key.private=
captcha.engine.recaptcha.key.public=
captcha.engine.recaptcha.url.script=http://api.recaptcha.net/
challenge?k=
captcha.engine.recaptcha.url.noscript=http://api.recaptcha.net/
noscript?k=
captcha.engine.recaptcha.url.verify=http://api-verify.recaptcha.net/
verify
```

As shown in the previous code, the portal sets whether or not to use CAPTCHA checks for actions: `create account`, send `password`, `edit category` of message boards, `edit message` of message boards. It also sets the engine used to generate CAPTCHAs. Here, reCAPTCHA uses an external service that must be configured independently but provides an audible alternative, which makes the CAPTCHA accessible to the visually impaired.

For reCAPTCHA, you would be able to specify your own `public key`, `private key`, `url script`, `url non-script`, and `url verify`. Of course, you will be able to overwrite these properties in `portal-ext.properties`, or you can do the same through UI—**Control Panel** | **Server Administration** | **Captcha**.

Summary

In this chapter, we addressed how to use UI taglib and how to develop custom portlets by adding UI taglib in pages. Particularly, we saw important UI taglib such as asset tag and categories, search container, custom attributes, tab, toggle, calendar, breadcrumb, navigation, panel, social activity, social bookmarks, discussion, ratings, diff, flags, icon, input, and many other useful UI tags.

In the next chapter, we're going to introduce the themes in production.

10
User Interface in Production

In production, you may have a lot of things related to User Interface (UI). For example, you may use jQuery in UI development in Liferay 5.2 or previous versions for a while. Now you are going to use jQuery in UI development again with Liferay portal 6 or above version. The question is: how can you use jQuery in plugins? For the same reason, you may need workflow capability UI, custom attributes UI, social related UI, Friendly URL, and so on. Moreover, UI may get affected when upgrading portal and plugins from old version to latest version. Of course, the UI will get affected too when themes got deployed in production.

This chapter will show you how to develop and/or customize user interface through plugins. In this chapter, we will look at:

- jQuery in plugins
- Workflow capabilities in plugins
- Custom attributes capabilities in plugins
- Friendly URL routing and mapping
- Social UI—OpenSocial, Social Activity, and Social Equity
- Themes deployment in production

jQuery in plugins

jQuery is a fast and concise JavaScript Library that simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development. jQuery is designed to change the way that you write JavaScript. Refer to `http://jquery.com`.

As you may have noticed, Liferay portal 5.2.x or previous versions use jQuery 1.2.6. Upgrading Liferay portal to use a new library would be hard, as new versions of jQuery are not backwards compatible and several features such as drag-and-drop may be broken.

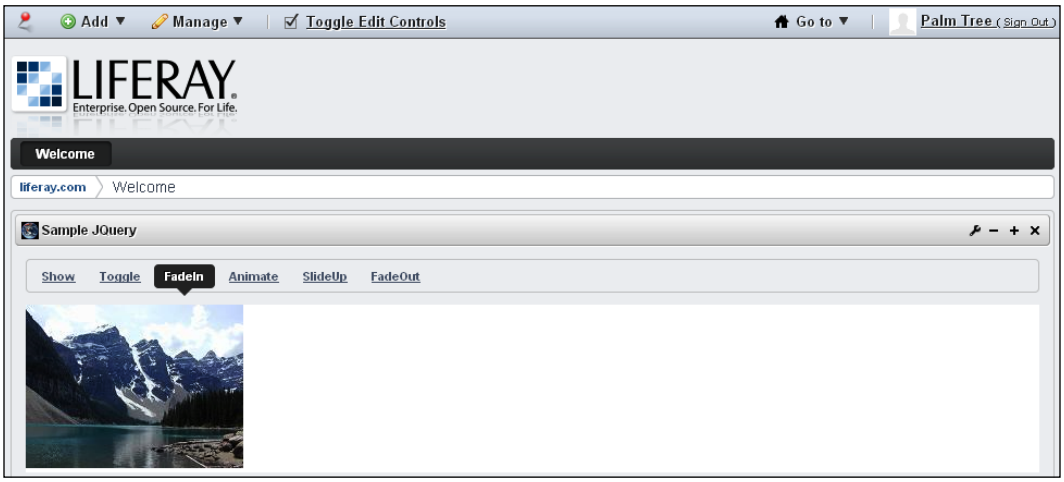
Starting from Liferay 6, the portal uses the Alloy UI (which is built on top of **YUI3**) instead of jQuery. That is, jQuery is no longer included by default. Therefore, you can use any version of jQuery you need for your custom plugins. There are a couple of ways you can include jQuery or other JavaScript libraries onto the page.

Liferay 6 solves JavaScript libraries conflicts by creating unique namespace. As still using a JavaScript library (that is, **YUI3**), it would be possible to have the same risk of conflicts. So instead of calling `YUI()` in the portal, Liferay 6 created `AUI()`. By creating the `AUI` namespace, Liferay 6 is able to guarantee that the environment won't conflict with someone who wants to upgrade version of YUI3 in the future.

This section will address how to include jQuery in portlets, themes, and Alloy UI. For the same reason, you would be able to include other JavaScript libraries such as **YUI2** (refer to `http://developer.yahoo.com/yui/2/`), **Dojo** (refer to `http://www.dojotoolkit.org`), **qooxdoo** (refer to `http://qooxdoo.org`), **Ext JS** (refer to `http://www.sencha.com`), and so on.

jQuery in portlets

In this section, we're going to build a sample jQuery portlet which will use latest version of jQuery as shown in following screenshot:



In order to build a portlet using latest version of jQuery, you should take following steps:

- Build a project called `sample-jquery-portlet` with folder `docroot` and `build.xml`
- Add CSS under the folder `/docroot/css` like `jquery-ui.custom.css`
- Add images under the folder `/docroot/images`

- Add jQuery under the folder `/docroot/js` like `jquery.js` and `jquery-ui-custom.js`
- Add `liferay-display.xml`, `liferay-plugin-package.properties`, `liferay-portlet.xml`, `portlet.xml` under the folder `/docroot/WEB-INF`

Add following lines to the portlet specification file `liferay-portlet.xml`.

```
<portlet>
    <portlet-name>1</portlet-name>
    <icon>/images/world.png</icon>
    <header-portlet-css>/css/jquery-ui.custom.css</header-portlet-css>
    <header-portlet-javascript>/js/jquery.js</header-portlet-
javascript>
    <footer-portlet-javascript>/js/jquery-ui-custom.js</footer-
portlet-javascript>
    <css-class-wrapper>sample-jquery-portlet</css-class-wrapper>
</portlet>
```

Note that the property `header-portlet-javascript` sets the path of JavaScript that will be referenced in the page's header relative to the portal's context path; and the property `footer-portlet-javascript` sets the path of JavaScript that will be referenced in the page's footer relative to the portal's context path.

Add JSP files under the folder `/docroot/jsp`.

Note that you may include additional JavaScript in JSP file or HTML file like:

```
<script type='text/javascript' src='js/jquery_1.4.4.js'></script>
```

The above code will make jQuery available for everywhere in Liferay.

Obviously, if you want to use different jQuery version other than 1.4.4, you can go to the folder `${sample.jquery.portlet.war}/js` and update JavaScript libraries `jquery.js` and `jquery-ui-custom.js` with the expected version.

Suppose that you had developed custom portlets which were heavily using jQuery in Liferay portal 5.1 or Liferay portal 5.2, and now you are planning to migrate to Liferay portal 6. As you can see, you would be able to simply add different version of jQuery JavaScript libraries `jquery.js` and `jquery-ui-custom.js` in portlet specification `liferay-portlet.xml` as follows.

```
<header-portlet-css>/css/jquery-ui.custom.css</header-portlet-css>
<header-portlet-javascript>/js/jquery.js</header-portlet-javascript>
<footer-portlet-javascript>/js/jquery-ui-custom.js</footer-portlet-
javascript>
```

That's it. It is simple, isn't it?

jQuery in Themes

Suppose that you are using a URL to latest version like `http://code.jquery.com/jquery-1.4.4.min.js`, and you are going to add JavaScript Libraries jQuery in themes. Definitely you would be able to add JavaScript Libraries jQuery into your theme. Inside of your theme's `/docroot/_diff/templates/portal_normal.vm` you would add this line in the head of your theme:

```
<script src="http://code.jquery.com/jquery-1.4.4.min.js"></script>
```

The above code will make jQuery available for everywhere in Liferay portal, including portal core portlet and plugins that you deploy.

jQuery in Alloy UI

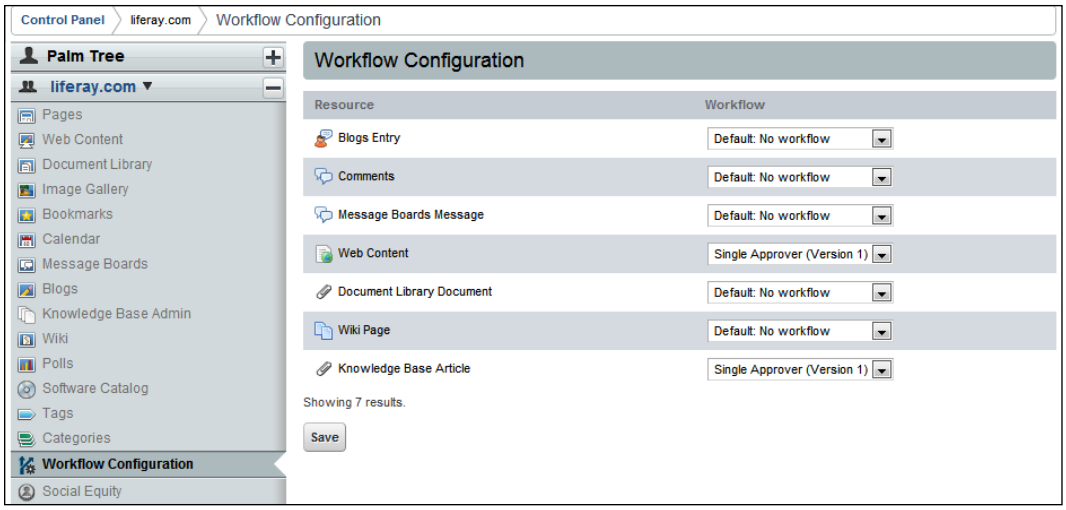
Of course, you can use Alloy UI to load up other JavaScript files including jQuery. This approach would be useful if you don't want to edit either the `liferay-portlet.xml` or the HTML file or the JSP file. In any JavaScript that gets added to the page, you can add following code:

```
AUI().use('get', function(A){
 A.Get.script('http://code.jquery.com/jquery-1.4.4.min.js', {
   onSuccess: function(){
      // add your own jQuery code here
   }
 });
});
```

As shown in the above code, you can add your jQuery code inside the method `onSuccess: function()`. Note that you would be able to replace a URL to the latest version, like `http://code.jquery.com/jquery-1.4.4.min.js` with local jQuery JavaScript libraries.

Workflow capabilities in plugins

Liferay 6 integrates workflow systems such as **jBPM** or **Kaleo** on, either core assets or custom assets. Ideally, workflow would be available for any assets, either portal core assets or plugins custom assets. But out-of-the-box Liferay 6 supports workflow capabilities only on core assets such as Blogs Entry, Comments, Document Library the Document, Message Boards Messages, Web Content, and Wiki Pages as shown in following screenshot:



How to add workflow capabilities on custom assets in plugins

This section will introduce how to add workflow capabilities to any custom assets in plugins. Knowledge Base articles will be used as an example of custom assets. In brief, the Knowledge Base plugin enables companies to consolidate and manage the most accurate information in one place. For example, a user manual is always updated; users are able to rate, to add workflow and to provide feedback on these Knowledge Base articles.

Preparing a plugin—Knowledge Base

First of all, let's prepare a plugin with workflow capabilities, called Knowledge Base. Note that the plugin Knowledge Base here is used as an example only. You can have your own plugin as well.

What's Knowledge Base?

The plugin Knowledge Base allows authoring articles and organize them in a hierarchy of navigable categories. It leverages Web Content articles, structures, and templates; allows rating on articles; allows commenting on articles; allows adding hierarchy of categories; allows adding tags to articles; exports articles to PDF and other formats; supports workflow; allows adding custom attributes (called custom fields); supports indexing and advanced search; allows using the rule engine and so on.

Most importantly the plugin Knowledge Base supports import of a semantic markup language for technical documentation called DocBook. DocBook enables its users to create document content in a presentation-neutral form that captures the logical structure of the content; that content can then be published in a variety of formats, such as HTML, XHTML, EPUB, and PDF, without requiring users to make any changes to the source. Refer to `http://www.docbook.org/`.

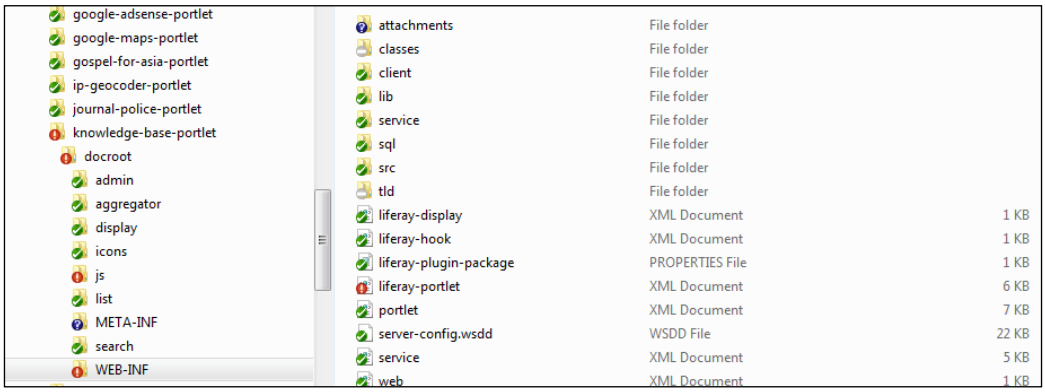
In general, the plugin Knowledge Base provides four portlets inside: **Knowledge Base Admin** (managing knowledge base articles and templates), **Knowledge Base Aggregator** (publishing knowledge base articles), **Knowledge Base Display** (displaying knowledge base articles) and **Knowledge Base Search** (the ability to search knowledge base articles).

Structure

The plugin Knowledge Base has following folder structure under the folder `$PLUGIN_SDK_HOME/knowledge-base-portlet`.

- **admin**: View JSP files for portlet Admin
- **aggregator**: View JSP files for portlet Aggregator
- **display**: View JSP files for portlet Display
- **icons**: Icon images files
- **js**: JavaScript files
- **META-INF**: Contains `context.xml`
- **search**: View JSP files for portlet Search
- **WEB-INF**: Web info specification; includes subfolders classes, client, lib, service, SQL, src, and tld

As you can see, JSP files such as `init.jsp` and `css_init.jsp` are located in the folder `$PLUGIN_SDK_HOME/knowledge-base-portlet`.



Services and models

As you may have noticed, the plugin Knowledge Base has specified services and models with the package named `com.liferay.knowledgebase`. You would be able to find details at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/service.xml`. Service-Builder in Plugins SDK will automatically generate services and models against `service.xml`, plus XML files such as `portlet-hbm.xml`, `portlet-model-hints.xml`, `portlet-orm.xml`, `portlet-spring.xml`, `base-spring.xml`, `cluster-spring.xml`,`dynamic-data-source-spring.xml`, `hibernate-spring.xml`, `infrastructure-spring.xml`, `messaging-spring.xml`, and `shard-data-source-spring.xml` under the folder `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/src/META-INF`.

The `service.xml` specified Knowledge Base articles as entries: `Article`, `Comment`, and `Template`. The entry `Article` included columns: `article Id` as primary key, `resource Prim Key`, `group Id`, `company Id`, `user Id`, `user Name`, `create Date`, `modified Date`, `parent resource Prim Key`, `version`, `title`, `content`, `description`, and `priority`; the entry `Template` included columns: `template Id` as primary key, `group Id`, `company Id`, `user Id`, `user Name`, `create Date`, `modified Date`, `title`, `content`, and `description`; while the entity `Comment` included columns: `comment Id` as primary key, `group Id`, `company Id`, `user Id`, `user Name`, `create Date`, `modified Date`, `class Name Id`, class `PK`, `content` and `helpful`. As you can see, the entity `Comment` could be applied on either any core assets or custom assets like `Article` and `Template` by using `class Name Id` and `class PK`.

By the way, the custom SQL scripts were provided at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/src/custom-sql/default.xml`. In addition, resource actions, that is, permission actions specification—are provided at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/src/resource-actions/default.xml`.

Of course, you can use Ant target `build-wsdd` to generate WSDD server configuration file `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/server-config.wsdd` and to use Ant target `build-client` plus `namespace-mapping.properties` to generate web service client JAR file like `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/client/known-base-portlet-client.jar`. In brief, based on your own custom models and services specified in `service.xml`, you can easily build service, WSDD, and web service client in plugins of Liferay 6 or above version.

Adding workflow instance link

First, you have to add a workflow instance link and its related columns and finder in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/service.xml` as follows.

```
<column name="status" type="int" />
<column name="statusByUserId" type="long" />
<column name="statusByUserName" type="String" />
<column name="statusDate" type="Date" />
<!-- ignore details -->
<finder name="R_S" return-type="Collection">
  <finder-column name="resourcePrimKey" />
  <finder-column name="status" />
</finder>
<!-- ignore details -->
<reference package-path="com.liferay.portal" entity="WorkflowInstance
Link" />
```

As shown in the above code, the `column` element represents a column in the database, four columns like `status`, `statusByUserId`, `statusByUserName`, and `statusDate` are required for Knowledge Base workflow, storing workflow related status, and user info; the `finder` element represents a generated finder method, the method finder `R_S` is defined as `Collection` (an option) for return type with two columns, for example, `resourcePrimkey` and `status`; where the `reference` element allows you to inject services from another `service.xml` within the same class loader. For example, if you inject the `Resource` (that is, `WorkflowInstanceLink`) entity, then you'll be able to reference the `Resource` services from your service implementation via the methods `getResourceLocalService` and `getResourceService`. You'll also be able to reference the `Resource` services via the variables `resourceLocalService` and `resourceService`.

Then, you need to run ANT target `build-service` to rebuild service based on newly added workflow instance link.

Adding workflow handler

Liferay 6 provides pluggable workflow implementations, where developers can register their own workflow handler implementation for any entity they build. It will appear automatically in the workflow admin portlet so users can associate workflow entities with available permissions. To make it happen, we need to add the Workflow Handler in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/liferay-portlet.xml` of plugin as follows.

```
<workflow-handler>com.liferay.knowledgebase.admin.workflow.
ArticleWorkflowHandler</workflow-handler>
```

As shown in the above code, the `workflow-handler` value must be a class that implements `com.liferay.portal.kernel.workflow.BaseWorkflowHandler` and is called when the workflow is run.

Of course, you need to specify `ArticleWorkflowHandler` under the package `com.liferay.knowledgebase.admin.workflow`. The following is an example code snippet:

```
public class ArticleWorkflowHandler extends BaseWorkflowHandler {
 public String getClassName(){/* get target class name */};
 public String getType(Locale locale) {/* get target entity type, that
is, Knowledge base article*/};
 public Article updateStatus( int status, Map<String, Serializable>
workflowContext) throws PortalException, SystemException {/* update
workflow status*/};
 protected String getIconPath(ThemeDisplay themeDisplay) {/* find icon
path */
return ArticleLocalServiceUtil.updateStatus(userId, resourcePrimKey,
status, serviceContext); };
}
```

As you can see, `ArticleWorkflowHandler` extends `BaseWorkflowHandler` and overrode the methods `getClassName`, `getType`, `updateStatus`, and `getIconPath`. That's it.

Updating workflow status

As mentioned in the previous section, you added the method `updateStatus` in `ArticleWorkflowHandler`. Now you should provide implementation of the method `updateStatus` in `com.liferay.knowledgebase.service.impl.ArticleLocalServiceImpl.java`. The following is some example sample code:

```
public Article updateStatus(long userId, long resourcePrimKey, int
status, ServiceContext serviceContext) throws PortalException,
SystemException {
/* ignore details */
// Article
Article article = getLatestArticle(resourcePrimKey, WorkflowConstants.
STATUS_ANY);
articlePersistence.update(article, false);
if (status != WorkflowConstants.STATUS_APPROVED) { return article; }
// Articles
// Asset
// Social
// Indexer
// Attachments
// Subscriptions
}
```

As shown in above code, it first gets latest article by `resourcePrimKey` and `WorkflowConstants.STATUS_ANY`. Then, it updates the article based on the workflow status. And moreover, it updates articles display order, asset tags and categories, social activities, indexer, attachments, subscriptions, and so on.

After adding new method at `com.liferay.knowledgebase.service.impl.ArticleLocalServiceImpl.java`, you need to run ANT target `build-service` to build services.

Adding workflow-related UI tags

Now it is time to add workflow related UI tags (AUI tags are used as an example) at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/admin/edit_article.jsp`. First of all, add the AUI input workflow action with value `WorkflowConstants.ACTION_SAVE_DRAFT` as follows.

```
<aui:input name="workflowAction" type="hidden" value="<%=
WorkflowConstants.ACTION_SAVE_DRAFT %>" />
```

As shown in above code, the default value of AUI input `workflowAction` was set as `SAVE DRAFT` with type `hidden`. That is, this AUI input is invisible to end users.

Afterwards, it would be better to add workflow messages by UI tag `liferay-ui:message`, like `a-new-version-will-be-created-automatically-if-this-content-is-modified` for `WorkflowConstants.STATUS_APPROVED`, and `there-is-a-publication-workflow-in-process` for `WorkflowConstants.STATUS_PENDING`.

```
<% int status = BeanParamUtil.getInteger(article, request, "status",
WorkflowConstants.STATUS_DRAFT); %>
<c:choose>
<c:when test="<%= status == WorkflowConstants.STATUS_APPROVED %>">
<div class="portlet-msg-info">
<liferay-ui:message key="a-new-version-will-be-created-automatically-
if-this-content-is-modified" />
</div> </c:when>
<c:when test="<%= status == WorkflowConstants.STATUS_PENDING %>">
<div class="portlet-msg-info">
<liferay-ui:message key="there-is-a-publication-workflow-in-process"
/>
</div></c:when>
</c:choose>
```

And then add AUI workflow status tag `aui:workflow-status` at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/admin/edit_article.jsp`.

```
<c:if test="<%= article != null %>">
 <aui:workflow-status id="<%= String.valueOf(resourcePrimKey) %>"
status="<%= status %>" version="<%= GetterUtil.getDouble(String.
valueOf(version)) %>" />
</c:if>
```

As you can see, `aui:workflow-status` is used to represent workflow status. Similarly you can find other AUI tags like `a`, `button`, `button_row`, `column`, `field_wrapper`, `fieldset`, `form`, `input`, `layout`, `legend`, `option`, `panel`, `script`, and `select`.

Finally you should add the JavaScript to implement the function `publishArticle()` as follows:

```
function <portlet:namespace />publishArticle() {
 document.<portlet:namespace />fm.<portlet:namespace />workflowAction.
value = "<%= WorkflowConstants.ACTION_PUBLISH %>";
 <portlet:namespace />updateArticle();
}
```

As you can see, the workflow action value is set as `WorkflowConstants.ACTION_PUBLISH`. You have added workflow capabilities on Knowledge Base articles in plugins. From now on, you will be able to apply workflow on Knowledge Base articles through Control Panel.

Where would you find sample code—Knowledge Base plugin with workflow capabilities?

You can find a WAR file of the Knowledge Base plugin with workflow capabilities from the attached folder `/code`.

```
/code/knowledge-base-portlet-6.0.6.1.war
```

Next, deploy it. You will be able to see portlets available like Knowledge Base Admin, Knowledge Base Aggregator, Knowledge Base Display, and Knowledge Base Search.

You may be interested in the latest version of Knowledge Base plugin with workflow capabilities. Thus you can find the latest code at.

```
svn://svn.liferay.com/repos/public/plugins/trunk/portlets/knowledge-
base-portlet
```

Custom attributes in plugins

The portal provides a framework to add custom attributes or call custom fields to any Service-Builder generated entities at runtime, where indexed values, text boxes, and selection lists for input and dynamic UI are available. For example, you could add custom fields on any entity like a wiki page, Message Boards category, Message Boards message, Calendar event, page, organization, user, Web Content, Document Library document, Document Library folder, Bookmarks entry, Bookmarks folder, Image Gallery image, Image Gallery folder, Blogs entry, and so on. Note that the custom fields UI displays assets in alphabetical order, instead of a random order.

Adding custom attributes capabilities

You can also add custom fields to custom entities like Knowledge Base Articles in plugins. As shown in the following screenshot, custom attributes are available on Knowledge Base articles. That is, you would be able to add a set of **Custom Fields** to Knowledge Base articles. Note that all **Custom Fields** could be indexed and search performance on custom fields will be very good.

As shown in the above screenshot, you can add a custom attribute, for example, **Type**, on the **Knowledge Base Article** first. Then you can input or update the value of **Type**; for instance, when you create a new **Knowledge Base Article** or update an existing **Knowledge Base Article**. Of course, you can add many custom attributes on **Knowledge Base Articles** according to your requirements. This is a nice way to extend your current data model, like Knowledge Base Articles. But how do you make it happen? Refer to the following section for more information.

How to make custom attributes?

In this section, we're going to introduce how to add custom attributes to custom entities in plugins. The entities Knowledge Base Articles will be used as an example. In brief, it should be simple to make it with following steps.

Adding custom attributes as references

First, you have to add custom attributes as references in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/service.xml` as follows.

```
<reference package-path="com.liferay.portlet.expando"
entity="ExpandoValue" />
```

As shown in above code, the `reference` element allows you to inject services from another `service.xml`, that is, from portal core, within the same class loader. For example, if you inject the `ExpandoValue` entity, then you'll be able to reference the Custom Attributes services from your service implementation via the methods `getExpandoValueLocalService` and `getExpandoValueService`. You'll also be able to reference the Custom Attributes services via the variables `ExpandoValueLocalService` and `ExpandoValueService`.

Then, you need to run ANT target `build-service` to build service based on newly added custom attributes reference.

Adding custom attributes display

Liferay 6 provides pluggable custom attributes implementations, where developers can register their own custom attributes' display implementation for any entity they build. It will appear automatically in the **Custom Fields** admin portlet, so users can associate custom attributes entities with available permissions. To make it happen, we need to add `custom attributes display` in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/liferay-portlet.xml` of plugin as follows:

```
<custom-attributes-display>com.liferay.knowledgebase.admin.
ArticleCustomAttributesDisplay</custom-attributes-display>
```

As you can see, the tag `custom-attributes-display` value must be a class that implements `com.liferay.portlet.expando.model.CustomAttributesDisplay` and is called by Custom Fields administration UI.

Then you need to create the class `com.liferay.knowledgebase.admin.ArticleCustomAttributesDisplay`, which implements `com.liferay.portlet.expando.model.CustomAttributesDisplay` as follows:

```
public class ArticleCustomAttributesDisplay extends
BaseCustomAttributesDisplay {
public static final String CLASS_NAME = Article.class.getName();
public String getClassName() { return CLASS_NAME; }
public String getIconPath(ThemeDisplay themeDisplay) {
 return themeDisplay.getPathThemeImages() + "/common/pages.png"; }
}
```

As you can see, `ArticleCustomAttributesDisplay` extends `BaseCustomAttributesDisplay` and overrode the methods `getClassName` and `getIconPath`. That's simple, isn't it?

Adding custom attributes capabilities when creating, updating, and indexing custom entities

When creating new entities or updating an existing entity, we do need to update custom attribute consequently. How can you do this? First of all, you could update implementation of the methods `addArticle` and `updateArticle` before the line `// Asset` in `com.liferay.knowledgebase.service.impl.ArticleLocalServiceImpl.java`. The following is sample code:

```
// Expando
ExpandoBridge expandoBridge = article.getExpandoBridge();
expandoBridge.setAttributes(serviceContext);
```

As shown in the above code, `ArticleLocalServiceImpl` gets custom attributes entity, that is, `ExpandoBridge`, first. Then it sets attributes based on current service content. Next, it tells the portal that custom attributes of current entity will get updated.

Afterwards when indexing custom entities, custom attributes should get indexed, too. How? You could update implementation of the method `doGetDocument` in `com.liferay.knowledgebase.admin.util.AdminIndexer`. The following is sample code:

```
ExpandoBridge expandoBridge = article.getExpandoBridge();
//ignore details
ExpandoBridgeIndexerUtil.addAttributes(document, expandoBridge);
return document;
```

Note that the line which gets custom attributes entity, that is, `ExpandoBridge`, should be added before generating `document`. In the same way, the line which adds custom attributes into the document before returning the document. By these lines, all custom attributes of current entity will get indexed.

Adding custom attributes UI tags

Last but not least, you need to add custom attributes UI tags in order to take custom attributes as input or to display custom attributes with values for current custom entity, for example, Knowledge Base Article.

To do so, you should add custom attributes UI tags to create or update custom attributes values after creating or updating `content` at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/admin/edit_article.jsp` as follows.

```
<liferay-ui:custom-attributes-available className="<%= Article.class.
getName() %>">
 <liferay-ui:custom-attribute-list
  className="<%= Article.class.getName() %>"
  classPK="<%= (article != null) ? article.getArticleId() : 0 %>"
  editable="<%= true %>"
  label="<%= true %>"
 />
</liferay-ui:custom-attributes-available>
```

Logically you could re-arrange UI forms (`title`, `content`, `description`, and `custom attributes`) as you expected. For example, you can add above code before or after the line `<aui:input name="title" />`.

For the same reason, you should add custom attributes UI tags to display custom attributes with their values after displaying `content` at `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/admin/view_article.jsp` as follows:

```
<liferay-ui:custom-attributes-available className="<%= Article.class.
getName() %>">
 <liferay-ui:custom-attribute-list
  className="<%= Article.class.getName() %>"
  classPK="<%= (article != null) ? article.getArticleId() : 0 %>"
  editable="<%= false %>"
  label="<%= true %>"
 />
</liferay-ui:custom-attributes-available>
```

As you can see, the UI tag which is used to display custom attributes and their values is same as that of creating or updating custom attributes values.

Where would you find sample code—Knowledge Base plugin with custom attributes capabilities?

You can simply download WAR of Knowledge Base plugin with custom attribute capabilities from attached code folder:

```
/code/knowledge-base-portlet-6.0.6.1.war
```

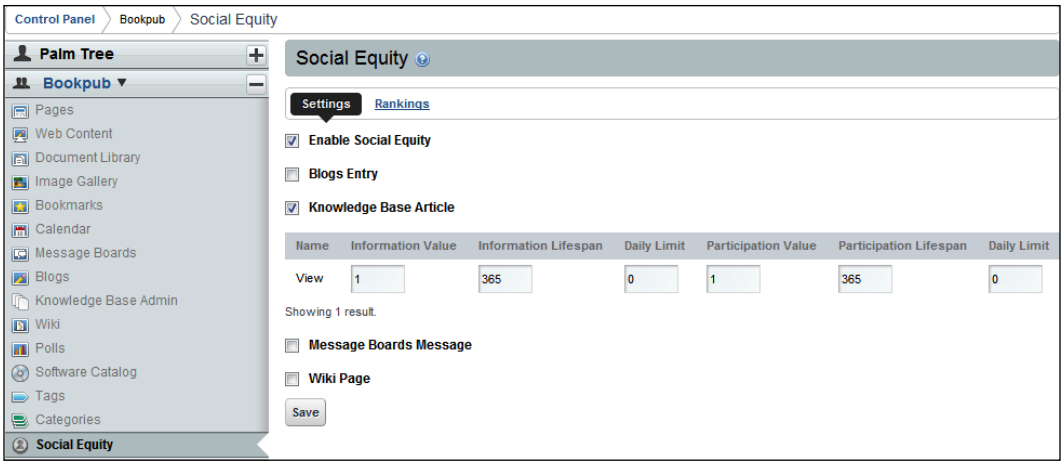
And then deploy it. That's it.

OpenSocial, Social Activity, and Social Equity in Plugins

User interfaces should be sociable. That is, friends should be able to share their social data on the Web using social user interfaces.

OpenSocial is a set of common application programming interfaces (APIs) for web-based social network applications. As you will have noticed, friends are fun, but they're only on specific websites. Fortunately OpenSocial provides abilities for these sites to share their social data on the Web. OpenSocial API based applications can be embedded within a social network itself, or it could be able to access a site's social data from anywhere on the Web. In brief, OpenSocial defines a common API for social applications across multiple websites. With standard JavaScript and HTML, users can create applications that access a social network's friends and update feeds. Refer to `http://www.opensocial.org`.

As shown in following screenshot, **Social Equity** is a dynamic social capital system which measures the contribution and participation of a user and the information value of an asset. A user can gain equity through certain activities performed in communities.



Currently there are three portlets that use the social equity service. These are the Wiki, Blogs, and Message Boards. In addition, My Equity portlet shows the user's current equity scores and ranking for the group, community, or organization. The portlet is also capable of showing the user's active history of social equity actions on a line chart as well as displaying a selected date in detail in human readable form.

Furthermore, a bridge between social equity actions and social activities is expected anyway, so that social activity interpreters could be used as a basis to generate human readable history of social equity actions. This would be used in the My Equity portlet, but it could also be a nice feature for plugins. Moreover, the portal provides Top Valued Users portlet, similar to Friends portlet that shows users in a group ordered by their personal equity ranking.

This section will discuss OpenSocial, social activity and social equity in plugins in details. Again, we are going to use Knowledge Base plugin as an example.

OpenSocial

The portal acts as OpenSocial container, as it uses **Apache Shindig** as its default OpenSocial container. Apache Shindig is an OpenSocial container and helps us starting hosting OpenSocial applications quickly by providing the code to render gadgets, proxy requests, and handle REST, and RPC requests. As an OpenSocial container, it is hosting social application consisting of four parts: **Gadget Container JavaScript**, **Gadget Rendering Server**, **OpenSocial Container JavaScript**, and **OpenSocial Data Server**. Refer to `http://shindig.apache.org/` for more information.

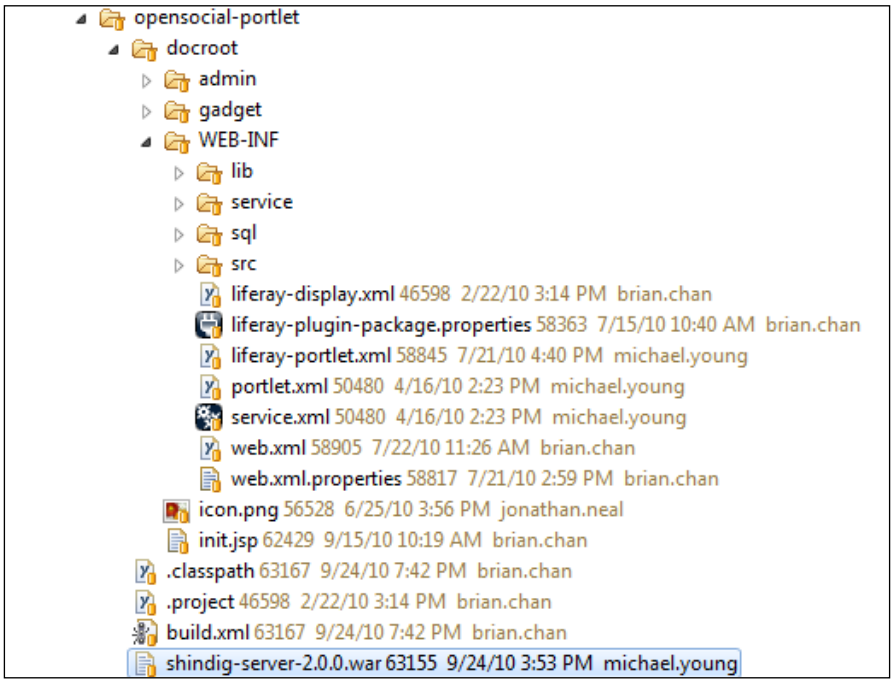
How does it work?

The portal provides an OpenSocial gadget plugin called `opensocial-portlet`. This plugin includes several main items as shown in following screenshot.

- It includes Apache Shindig open social container 2.0 as WAR.
- An entity `com.liferay.opensocial.Gadget` is specified in `service.xml`. The entity Gadget contains a few attributes: `Company Id`, `create date`, `modified date`, `name`, and `url`.
- There are two portlets: Admin portlet and Gadget portlet; the Admin portlet resides in **Control Panel | Portal**—used to configure gadgets; the Gadget portlet generates OpenSocial gadgets in the **Add Application** menu.
- JSP files of the Gadget portlet are present in the folder `/docroot/gadget`; CSS files are located in `/css/main.css` and JavaScript library can be found in `/js/main.js`. The following is snippet JavaScript code from `/gadget/view.jsp`:

```
<aui:script use="liferay-open-social-gadget">
 new Liferay.OpenSocial.Gadget( {
   appId: '<%= gadgetUrl %>',
   debug: '<%= PortletPropsValues.SHINDIG_JS_DEBUG %>',
   moduleId: '<%= moduleId %>',
   nocache: '<%= PortletPropsValues.SHINDIG_NO_CACHE %>',
   portletId: '<%= portletDisplay.getId() %>',
   secureToken: '<%= secureToken %>',
   serverBase: '<%= renderRequest.getContextPath() %>/gadgets/',
   specUrl: '<%= gadgetUrl %>',
   store: new Liferay.OpenSocial.Store.Expando({
     userPrefsKey: '<%= ShindigUtil.getColumnUserPrefs(renderRespo
nse.getNamespace()) %>' }),
   view: '<%= view %>',
   viewParams: '<%= ParamUtil.getString(renderRequest,
"viewParams") %>'
  } ).render('#<portlet:namespace />gadget');
</aui:script>
```

- JSP files of the Admin portlet are located in the folder `/docroot/admin`.


opensocial-portlet
docroot
admin
gadget
WEB-INF
lib
service
sql
src
liferay-display.xml 46598 2/22/10 3:14 PM brian.chan
liferay-plugin-package.properties 58363 7/15/10 10:40 AM brian.chan
liferay-portlet.xml 58845 7/21/10 4:40 PM michael.young
portlet.xml 50480 4/16/10 2:23 PM michael.young
service.xml 50480 4/16/10 2:23 PM michael.young
web.xml 58905 7/22/10 11:26 AM brian.chan
web.xml.properties 58817 7/21/10 2:59 PM brian.chan
icon.png 56528 6/25/10 3:56 PM jonathan.neal
init.jsp 62429 9/15/10 10:19 AM brian.chan
.classpath 63167 9/24/10 7:42 PM brian.chan
.project 46598 2/22/10 3:14 PM brian.chan
build.xml 63167 9/24/10 7:42 PM brian.chan
shindig-server-2.0.0.war 63155 9/24/10 3:53 PM michael.young

How to use it?

Liferay 6 featured an OpenSocial container based on Shindig. To configure gadgets in **Control Panel | Portal | Open Social**, all you need are gadget URLs, for example, following URLs with names `TODO`, `Horoscope`, and `Hello World` (this is a sample Shindig gadget), respectively.

```
http://www.labpixies.com/campaigns/todo/todo.xml
http://www.google.com/ig/modules/horoscope.xml
http://localhost:8080/opensocial-portlet/samplecontainer/examples/
SocialHelloWorld.xml
```

OpenSocial gadgets present as first-class citizens via the **Add Application** menu, just like normal portlets. Especially you would find OpenSocial gadgets under the category **Open Social**. For above OpenSocial gadget URLs, you would be able to see three gadgets: `TODO`, `Horoscope`, and `Hello World`.

Of course, you can add these gadgets anywhere your websites as you would expect. As you can see, it is easy to bring OpenSocial gadgets to your websites.

Where do you find sample code?

You may be interested in latest version of `opensocial-portlet` plugin. Thus you can find the latest code at:

```
svn://svn.liferay.com/repos/public/plugins/trunk/portlets/opensocial-portlet.
```

Social Activity

The portal provides a framework via the tag `social-activity-interpreter-class` called Social Activity Framework will allow registering Social Activity tracking to a portlet, core assets, or custom assets, so that generic portlets such as the Activities portlet, can be used to publish them. How can you register custom assets for social activity tracking? Lets use Knowledge Base plugin as an example.

Registering Social Activity tracking in plugins

To register custom assets like Knowledge Base article should be simple. You can add social activity tracking on Knowledge Base articles in following steps.

1. Create a class called `com.liferay.knowledgebase.admin.social.AdminActivityInterpreter` extending (`BaseSocialActivityInterpreter` has provided a set of social activity functions. Of course, you can implement `SocialActivityInterpreter` directly.) `com.liferay.portlet.social.model.BaseSocialActivityInterpreter` which directly implements `com.liferay.portlet.social.model.SocialActivityInterpreter` as follows:

   ```
   public interface SocialActivityInterpreter {
    public String[] getClassNames();// get class name
    public SocialActivityFeedEntry interpret(
     SocialActivity activity, ThemeDisplay themeDisplay);
   //social activity interpretation
   }
   ```

2. Add the social-activity-interpreter-class to `portlet.xml`

   ```
   <social-activity-interpreter-class>com.liferay.knowledgebase.
   admin.social.AdminActivityInterpreter</social-activity-
   interpreter-class>
   ```

As you can see, the tag `social-activity-interpreter-class` adds Social Activity tracking to a portlet, core assets, or custom assets, and recorded social activities will appear on the Activities portlet. Note that the tag `social-activity-interpreter-class` value must be a class that implements `com.liferay.portlet.social.model.SocialActivityInterpreter` and is called to interpret activities into friendly messages that are easily understandable by a human being.

That's it. As you can see, it is simple to add social activity tracking on custom assets.

Social Equity

As mentioned earlier, Social Equity can be used to measure the contribution and participation of a user and the information value of an asset. The activities that award equities include, but are not limited to: adding contributions, rating, commenting, viewing content, searching, and tagging.

The main values describing engagement in communities could be:

- **Information Equity** (short for **IQ**): The importance and quality of the information contained in an asset through social activities related to the information.
- **Contribution Equity** (short for **CQ**): The contribution of a person to the community from the information equity of the contributed assets.
- **Participation Equity** (short for **PQ**): The active participation of a person by measuring the feedback a person has provided to other community contributions (assets). Viewing a contribution could be regarded as feedback.
- **Personal Equity** (short for **PEQ**): The ultimate result, a person's achievements and participation in the community and / or the sum of a person's contribution and participation equities.

Currently there are three portlets (Wiki, Blogs, and Message Boards) that use the social equity service. The activities and their default values are configured in the `/resource-actions/wiki.xml`, `blogs.xml`, `messageboards.xml`.

For the Wiki, configured activities are `ADD_PAGE`, `VIEW`, and `ADD_DISCUSSION`; for Blogs configured activities are `ADD_ENTRY`, `VIEW`, and `ADD_DISCUSSION`; and for Message Boards, configured activities are `ADD_MESSAGE`, `ADD_VOTE`, `REPLY_MESSAGE`, and `VIEW`.

Adding Social Equity capabilities in plugins

Suppose that configured activity is `VIEW` in Knowledge Base plugin, how do you make it happen? Loosely speaking, adding social equity capabilities in plugins should is as simple as taking the following steps.

First, you can configure the activities and their default values in the resource actions' XML, that is, `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/src/resource-actions/default.xml`. You can simply add following lines before the line `</model-resource>` of the model `com.liferay.knowledgebase.model.Article`:

```
<social-equity>
 <social-equity-mapping>
    <action-key>VIEW</action-key>
    <information-value>1</information-value>
    <information-lifespan>365</information-lifespan>
    <participation-value>1</participation-value>
    <participation-lifespan>365</participation-lifespan>
 </social-equity-mapping>
</social-equity>
```

Then you should add social equity as references in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/service.xml` as follows.

```
<reference package-path="com.liferay.portlet.social"
entity="SocialEquityLog" />
```

Now it is time for you to re-build services by using ANT target `build-service`. That's it. From now on, you would be able to see that Knowledge base Article is available under **Control Panel | Social Equity | Settings**, as shown in previous screenshot.

What's happening?

In fact, the portal has specified following social equity related properties by default in `portal.properties`. Of course, you would be able to override these properties in `portal-ext.properties`:

```
social.equity.equity.log.check.interval=1440
social.equity.equity.log.enabled=true
```

As shown in above code, social equity feature is enabled by default and can be turned off by setting the property `social.equity.equity.log.enabled` to `false`. The property `social.equity.equity.log.check.interval` sets the interval like `1140` minutes on which the `CheckEquityLogMessageListener` will run. The value is set with one minute increments.

Friendly URL routing and mapping in plugins

User Interfaces may get affected when using friendly URL routing and mapping. URL routing or mapping could shorten URL, as you can see in browsers. This section will address URL routing.

URL routing

A route is a pattern for a URL. It includes named fragments automatically parsed from the URL into the parameter map. Every URL parsed by a route could also be generated from the resulting parameter map. In order to add routes in Knowledge Base plugins' Admin portlet, you could create an XML file `admin-friendly-url-routes.xml` with following lines at the package `com/liferay/knowledgebase/admin/portlet`. Of course, you can add routing XML for each portlet in one plugin project.

```
<?xml version="1.0"?>
<!DOCTYPE routes PUBLIC "-//Liferay//DTD Friendly URL Routes 6.0.0//
EN" "http://www.liferay.com/dtd/liferay-friendly-url-routes_6_0_
0.dtd">
<routes>
  <route>
    <pattern>/rss</pattern>
    <ignored-parameter name="jspPage" />
    <ignored-parameter name="p_p_state" />
    <implicit-parameter name="p_p_cacheability">cacheLevelPage</
implicit-parameter>
    <implicit-parameter name="p_p_lifecycle">2</implicit-parameter>
    <implicit-parameter name="p_p_resource_id">rss</implicit-
parameter>
  </route>
<!-- ignore details -->
</routes>
```

As you can see, the `routes` element is the root of the deployment descriptor for a set of Liferay friendly URL mapper routes; while the `pattern` element specifies the pattern of the mapped friendly URL; the `implicit-parameter` element specifies a parameter that is not present in the route pattern; and the `ignored-parameter` element specifies a parameter that should be ignored and not included in generated URLs. Note that `ignored parameters` don't impact URL recognition. Last but not least, the `overridden-parameter` element specifies a parameter that should be set to a certain value when a URL is recognized. This override value will be set regardless of any pre-existing value, including one from an implicit-parameter or one extracted from the URL.

You may be interested in the friendly URL routes DTD. You could find `liferay-friendly-url-routes_6_0_0.dtd` (for 6.0) and `liferay-friendly-url-routes_6_1_0.dtd` (for 6.1) at the folder `$PORTAL_SRC_HOME/definitions`.

What's happening?

To make it happen, we need to add Friendly URL Routes in `$PLUGIN_SDK_HOME/knowledge-base-portlet/docroot/WEB-INF/liferay-portlet.xml` of plugin as follows.

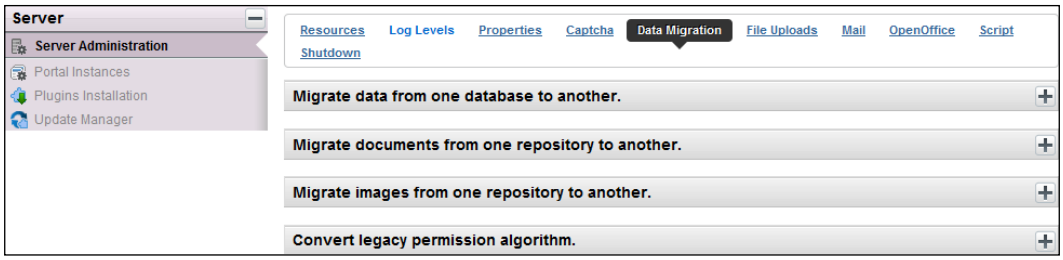
```
friendly-url-mapper-class>com.liferay.portal.kernel.portlet.
DefaultFriendlyURLMapper</friendly-url-mapper-class>
<friendly-url-mapping>knowledge_base</friendly-url-mapping>
<friendly-url-routes>com/liferay/knowledgebase/admin/portlet/admin-
friendly-url-routes.xml</friendly-url-routes>
```

As shown in the above code, the tag `friendly-url-routes` points to the XML file that defines the friendly URL routes. This file is read by the class loader. The tag `friendly-url-mapper-class` value must be a class that implements `com.liferay.portal.kernel.portlet.FriendlyURLMapper`. You should use this if content inside a portlet needs to have a friendly URL. The tag `friendly-url-mapping` specifies the mapping used to map a friendly URL prefix to a specific portlet. For more details about `FriendlyURLMappe`, you may refer to *Chapter 12* of the book *Liferay Portal 5.2 Systems Development*.

Data migration and portal upgrade

User Interfaces may get affected when upgrading portal from old version to latest version, like data migration, portal upgrade, and plugins upgrade.

As shown in following screenshot, the portal provides capabilities for database migration from existing database to another database; documents migration from one repository hook to another repository hook—called Document Library hooks migration; images migration from one repository hook to another repository hook—called Image Gallery hooks migration. How can you get it? Go to **Server | Server Administration | Data Migration** under **Control Panel**, you would see **Database Migration**, **Documents Migration** and **Images Migration**.



In addition, if you are currently using permission algorithm `1-5`, instead of permission algorithm `6`, you would see one more data migration—a message **Convert legacy permission algorithm** and a button **Execute**. With this capability, you could convert legacy permission algorithm `1-5` to `6`.

Furthermore, the portal provides default upgrade processes thus data could get upgraded with these default processes automatically. This section will discuss the details of data migration and portal upgrading.

Data migration

When doing data migration from one database to another, you need enter the following JDBC information for a new database.

```
jdbc.default.liferay.pool.provider=dbcp
JDBC Driver Class Name: like oracle.jdbc.driver.OracleDriver
JDBC URL: like jdbc:oracle:thin:@localhost:1521:xe
JDBC User Name: like lportal;
JDBC Password: like lportal
```

Note that if the target JDBC driver, for example `ojdbc6.jar` (Oracle database 11 JDBC driver) wasn't included by default at `/lib/ext`, for example in Tomcat `$TOMCAT_AS_DIR/lib/ext`, you should add the target JDBC driver at `/lib/ext`. By default, the portal has included a few JDBC drivers like `hsql.jar`, `mysql.jar`, `jtds.jar`, and `postgresql.jar`.

By default, the portal uses following File System Hook in `portal.properties`. The Document Library repository will use this hook persist documents.

```
dl.hook.impl=com.liferay.documentlibrary.util.FileSystemHook
```

Ideally, you can use Advanced File System Hook, CMIS hook, JCR hook, and S3 hook for Document Library implementation.

```
#dl.hook.impl=com.liferay.documentlibrary.util.AdvancedFileSystemHook
#dl.hook.impl=com.liferay.documentlibrary.util.CMISHook
dl.hook.impl=com.liferay.documentlibrary.util.FileSystemHook
#dl.hook.impl=com.liferay.documentlibrary.util.JCRHook
#dl.hook.impl=com.liferay.documentlibrary.util.S3Hook
```

Of course, you would be able to do repository migration from one hook to another as shown in above screenshot. In a word, every combination is possible.

```
#image.hook.impl=com.liferay.portal.image.DatabaseHook
#image.hook.impl=com.liferay.portal.image.DLHook
image.hook.impl=com.liferay.portal.image.FileSystemHook
```

For the same reason, you can use database hook, Document Library hook, and File System hook for Image Gallery implementation ideally. You can do repository migration from one hook to another. In a word, any combination is possible.

Portal upgrade

You may use one version of Liferay portal for a while. When new version comes out, you may wish to upgrade your current version to latest version. After upgrading, you would be able to benefit from new features of latest version. How to upgrade existing data to latest version? Let's address portal upgrade processes by an example.

Supposed that current version you are using is 5.2.7 (5.2 EE SP3) with database MySQL, you are planning to upgrade it to 6.0.10 (6.0 EE—same database schema as that of 6.0.6). How to upgrade existing data to latest version? In general, there are three approaches: **manual upgrade**, **explicit auto upgrade**, and **implicit auto upgrade**.

On the one hand, there are two main differences between version 5.2 and 6.0. That is, 5.2 uses algorithm 5 as default, 6.0 uses algorithm 6 as default; while 5.2 uses image hook `DatabaseHook` as default, 6.0 uses image hook `FileSystemHook` as default. On the other hand, both 5.2 and 6.0 use document hook `FileSystemHook`.

Manual upgrade

The manual upgrade approach would be useful if you need full control for data upgrade yourself. How to make it?

First of all, before upgrading, backup your database and repository.

Then in latest portal bundle add following lines to `portal-ext.properties`.

```
permissions.user.check.algorithm=5
image.hook.impl=com.liferay.portal.image.DatabaseHook
```

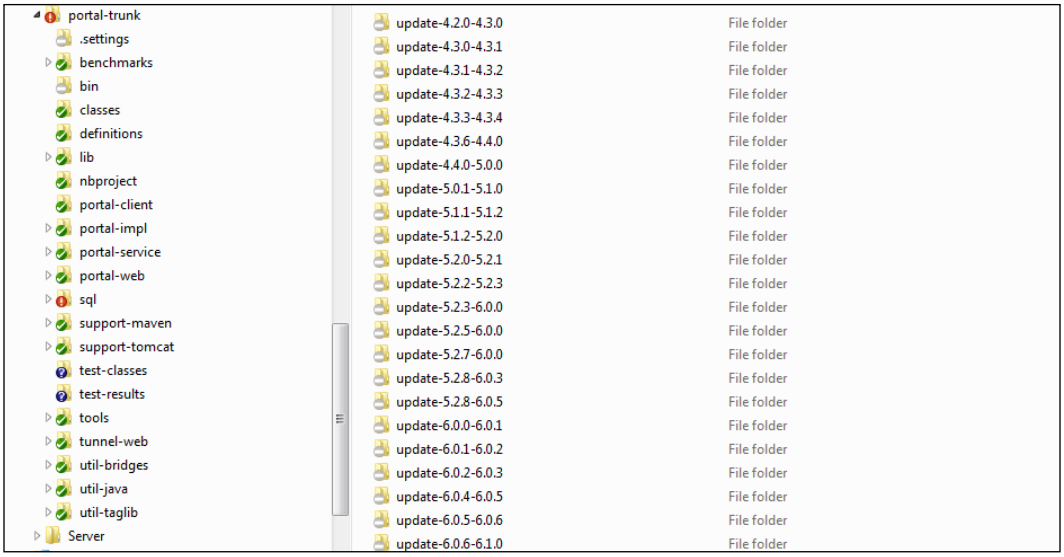
Then find database SQL scripts from version 5.2.7 to version 6.0.6; and execute database SQL scripts one by one, like `update-5.2.7-6.0.0-mysql.sql` under `/upgrade-5.2.7-6.0.0`, `update-6.0.0-6.0.1-mysql.sql` under `/upgrade-6.0.0-6.0.1`, `update-6.0.1-6.0.2-mysql.sql` under `/upgrade-6.0.1-6.0.2`, `update-6.0.2-6.0.3-mysql.sql` under `/upgrade-6.0.2-6.0.3`, `update-6.0.4-6.0.5-mysql.sql` under `/upgrade-6.0.4-6.0.5`, and `update-6.0.5-6.0.6-mysql.sql` under `/upgrade-6.0.5-6.0.6`.

Note that database SQL scripts must be executed in order from lower version to higher version. You should not do it in reverse order.

Before starting the portal, for example `6.0.6`, you need to update `buildNumber` of the table `Release_` with following database SQL script:

```
update Release_ set buildNumber=6006 where releaseId=1;
```

Why? As shown in following screenshot, you could find all database SQL scripts under `$PORTAL_SCR_HOME/sql`. The `buildNumber` is the portal version, which auto upgrade process will check. If the `buildNumber` was less than current portal version, like `6.0.6`, the auto upgrade process will get started automatically. Note that the list will be updated when new database SQL scripts have been introduced.



By default, there are portal generated database schema in a few databases, such as DB2, Derby, Firebird, Hypersonic, Informix, Ingres, jDatastore, MySQL, Oracle, PostgreSQL, SAP, SQL Server, and Sybase. You may use one of them in your production.

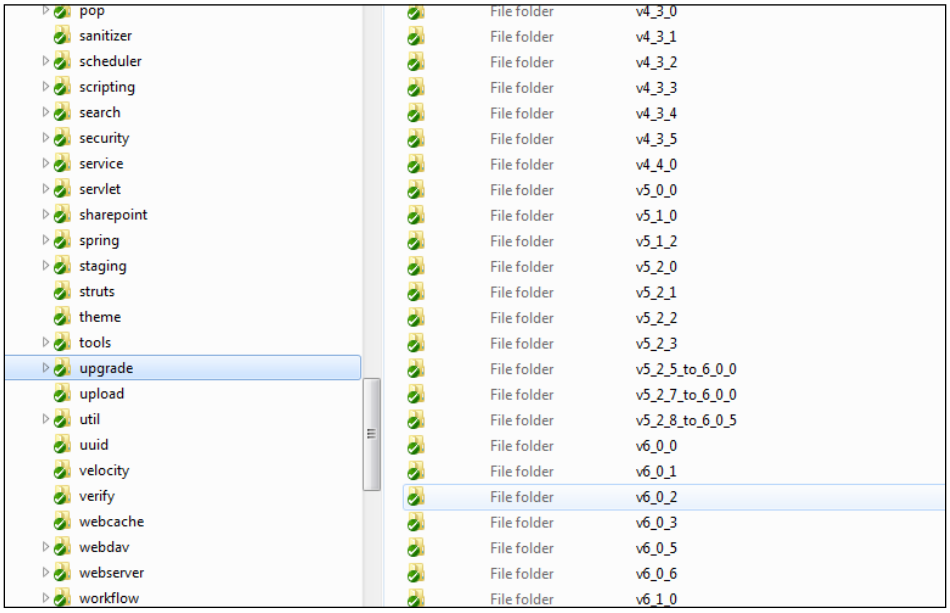
Explicit auto upgrade

Explicit auto upgrade would be helpful, too, if you wanted to upgrade EE version with explicit upgrade processes.

First, in the latest portal bundle add the following lines to `portal-ext.properties`.

```
upgrade.processes=\
com.liferay.portal.upgrade.UpgradeProcess_5_2_7_to_6_0_0,\
com.liferay.portal.upgrade.UpgradeProcess_6_0_1,\
com.liferay.portal.upgrade.UpgradeProcess_6_0_2,\
com.liferay.portal.upgrade.UpgradeProcess_6_0_3,\
com.liferay.portal.upgrade.UpgradeProcess_6_0_5,\
com.liferay.portal.upgrade.UpgradeProcess_6_0_6
permissions.user.check.algorithm=5
image.hook.impl=com.liferay.portal.image.DatabaseHook
```

After you start up the latest bundle, everything should get updated for you. As you can see, the property `upgrade.processes` got overridden with class names `com.liferay.portal.upgrade.UpgradeProcess_5_2_7_to_6_0_0`, and so on, where do you find all class names? As shown in following screenshot, you could find upgrade processes utilities at `$PORTAL_SRC_HOME/com/liferay/portal/upgrade`:



Implicit auto upgrade

Of course, you can use default upgrade processes specified in the portal. For example, you are planning to upgrade your current portal `5.2.3` to `6.0.5`. You could set following in `portal-ext.properties` in the portal `6.0.5` bundle:

```
permissions.user.check.algorithm=5
image.hook.impl=com.liferay.portal.image.DatabaseHook
```

Then start the portal. The portal will upgrade all data from the old version to the current portal version, using the default upgrade processes.

What's happening?

The portal specifies the following upgrade processes in `portal.properties`:

```
upgrade.processes= \
  com.liferay.portal.upgrade.UpgradeProcess_4_3_0,\
  //ignore details
  com.liferay.portal.upgrade.UpgradeProcess_6_0_0,\
  com.liferay.portal.upgrade.UpgradeProcess_6_0_1,\
  com.liferay.portal.upgrade.UpgradeProcess_6_0_2,\
  com.liferay.portal.upgrade.UpgradeProcess_6_0_3,\
  com.liferay.portal.upgrade.UpgradeProcess_6_0_5,\
  com.liferay.portal.upgrade.UpgradeProcess_6_0_6,\
  com.liferay.portal.upgrade.UpgradeProcess_6_1_0
```

As shown in the above code, a list of comma delimited class names implement `com.liferay.portal.upgrade.UpgradeProcess`. These classes will run on startup to upgrade older data to match with the latest version. Note that `UpgradeProcess_6_0_4` is not required, as there is no change of database schema in version `6.0.4`. And moreover, the EE version related upgrade processes are not included in above list. Therefore, if you need to upgrade EE version, you should take either manual upgrade or explicit auto upgrade.

When starting, the portal will check version in database and version in current portal first. Then it takes above classes and runs on startup to upgrade older data to match with the current portal version. Note that the `buildNumber` of the table `Release_` will get updated with current portal version at the end of the upgrade processes.

Legacy portal properties

If you are using 5.2 and now you are going to upgrade to 6.0, you may use the 5.2 portal properties legacy as follows.

```
users.image.max.height=0
users.image.max.width=0
locale.prepend.friendly.url.style=0
auth.token.check.enabled=false
permissions.user.check.algorithm=5
permissions.view.dynamic.inheritance=false
image.hook.impl=com.liferay.portal.image.DatabaseHook
cdn.host.http=${cdn.host}
cdn.host.https=${cdn.host}
virtual.hosts.default.community.name=
breadcrumb.show.guest.group=false
breadcrumb.show.parent.groups=false
wiki.page.titles.regexp=([^/\\\\\\[\\]%&?@]+)
wiki.page.titles.remove.regexp=([/\\\\\\[\\]%&?@]+)
```

As you can see, default image hook is `DatabaseHook` and algorithm is `5` by default, while default algorithm is `6` for version `6.0` or above. The default image hook is database hook. Anyway, you would be able to find `portal-legacy-5.2.properties` at `$PORTAL_ROOT_HOME/WEB-INF/classes`.

Of course, you may be in `5.1` at present. And now you may want to upgrade to `5.2`. Thus, you use `portal-legacy-5.1.properties` at `$PORTAL_ROOT_HOME/WEB-INF/classes` as follows.

```
resource.repositories.root=${user.home}/liferay
theme.portlet.sharing.default=true
organizations.country.required[regular]=true
organizations.assignment.auto=true
organizations.assignment.strict=false
organizations.membership.strict=true
lucene.dir=${resource.repositories.root}/lucene/
jcr.jackrabbit.repository.root=${resource.repositories.root}/
jackrabbit
discussion.thread.view=combination
dl.hook.impl=com.liferay.documentlibrary.util.JCRHook
dl.hook.file.system.root.dir=${resource.repositories.root}/document_
library
```

As you can see, default document hook is `JCRHook` and algorithm is `5` by default. The default image hook is database hook. Anyway, you would be able to find `portal-legacy-5.1.properties` at `$PORTAL_ROOT_HOME/WEB-INF/classes`.

For the same reason, you may use `portal-legacy-4.4.properties` and `portal-legacy-5.0.properties` at `$PORTAL_ROOT_HOME/WEB-INF/classes`, if you want to upgrade the portal from `4.4` to `5.0`, or from `5.0` to `5.1`, respectively.

Plugins upgrade

As you may have noticed, six kinds of plugins are available in Liferay—they are **portlets**, **themes**, **layout templates**, **hooks**, **Ext plugins**, and web application integrator (short for **WAI**, or called **webs**).

Portlets are mini web applications that run in a portion of a web page. They contain the actual functionality in a web page. Themes allow the look of the portal to be changed using a combination of CSS, Velocity templates and / or FreeMarker templates. Layout templates are similar to themes, except that they change the arrangement of portlets on a page rather than its look. Hooks can be used to modify portal properties or to perform custom actions on start-up, shutdown, login, logout, session creation, and session destruction. Ext plugins provide the high degree of flexibility in modifying the portal core, and allow you to replace essentially any class, JSP file, portal properties, or language properties with your own implementations.

The Web Application Integrator (WAI) will automatically deploy any standard Java servlet application as a portlet within Liferay. WAI (or called webs) is a pure web application where thin layer was added to provide checking for dependencies. A web-plugin adds support for embedding hook definition or Service Builder services within a plain web application. To use the WAI, you can simply copy an application WAR file into the auto-deploy directory, and then add the portlet to your page. The portal transparently handles the rest.

Ext environment upgrade

Starting from 6, the Ext environment no longer exists in its previous form. Instead, Ext environment becomes a plugin called Ext Plugins. If you are using the Ext Environment to change core code, now it is time for you to upgrade Ext Environment to Ext Plugin for core customizations. Why Ext plugins? Unlike the Ext Environment, Ext Plugin doesn't require the entire portal code (like `portal-impl.jar`, `portal-web.war`, and so on) and it has a smaller footprint as they only contain the differences or called deltas (that is, differences between portal core and custom code in Ext plugins). This makes it much easier to extend, and maintain changes to Liferay core, and is more powerful as `util-java` and `util-taglib` are ready to be modified in plugins.

How do you upgrade the Ext Environment? You can run the following command to migrate the code from the Ext Environment to EXT Plugins:

```
ant upgrade-ext -Dext.dir={ext.dir} -Dext.name=${project.name} -Dext.
display.name="${project.name}"
```

Where `-Dext.dir` is a command line argument point to the location of the Ext environment; `-Dext.name` is the name of the Ext Plugin that you want to create; `-Dext.display.name` is the display name, referring to `liferay-plugin-package.properties`.

As you can see, above ANT script created `${project.name}-ext` directory by merging changes from your Ext environment.

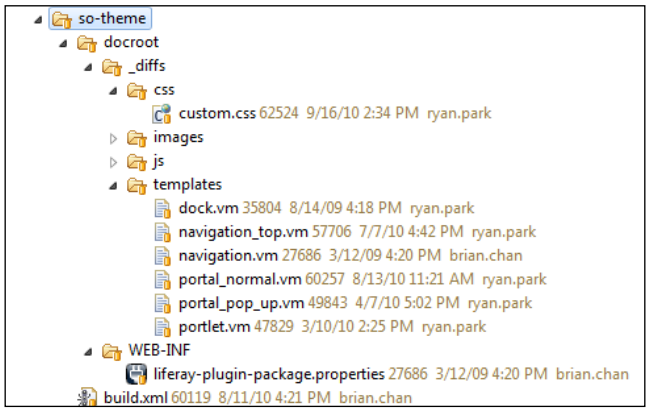
Note that Service-Builder in Ext plugins would be deprecated in future versions, and custom services should be migrated to portlet plugins.

Themes upgrade

When loading 5.2 themes into 6, you'll find that a lot of things break. The main reason for this is that with a new UI a lot of ID tags and the like changed. There is a systematic process allowing you to convert 5.2 themes into 6 compatible themes. It will take some CSS work, along with a few hours of your time.

First, create new theme project, for example, `so-theme`, with following structure.

1. Copy custom images to the folder `/_diffs/images`.
2. Copy custom JavaScript to the folder `/_diffs/js`.
3. Merge custom CSS into `custom.css` in the folder `/_diffs/css`.
4. Merge custom VM code into a VM file such as `portal_normal.vm`, `navigate.vm` in the folder `/_diffs/templates`.



Then rebuild your theme. That's it. You should be able to upgrade your theme properly.

Layout templates upgrade

The processes to upgrade layout templates are simple. It takes only three steps to upgrade layout templates from 5.2 to 6.

1. Change the header of `/WEB-INF/liferay-plugin-package.xml` to.

```
<?xml version="1.0"?>
<!DOCTYPE plugin-package PUBLIC "-//Liferay//DTD Plugin Package
6.0.0//EN" "http://www.liferay.com/dtd/liferay-plugin-package_6_0_
0.dtd">
```

2. Change the header of `/WEB-INF/liferay-layout-templates.xml` to:

```
<?xml version="1.0"?>
<!DOCTYPE layout-templates PUBLIC "-//Liferay//DTD Layout
Templates 6.0.0//EN" "http://www.liferay.com/dtd/liferay-layout-
templates_6_0_0.dtd">
```

3. Upgrade compatibility version in `/WEB-INF/liferay-plugin-package.xml`:

```
<liferay-versions>
 <liferay-version>6.0.0+</liferay-version>
</liferay-versions>
```

For the same reason, if you are using 6.1, you should update 6.0 with 6.1 and 6_0 with 6_1.

Portlets and hooks upgrade

Hooks always stay with portlets under one plugin project. The processes to upgrade portlets and hooks are little bit complex. It takes seven steps to upgrade portlets and hooks from `5.2` to `6`.

1. Change the header of `/WEB-INF/liferay-display.xml` to:

```
<?xml version="1.0"?>
<!DOCTYPE display PUBLIC "-//Liferay//DTD Display 6.0.0//EN"
"http://www.liferay.com/dtd/liferay-display_6_0_0.dtd">
```

2. Change the header of `/WEB-INF/liferay-hook.xml` to:

```
<?xml version="1.0"?>
<!DOCTYPE hook PUBLIC "-//Liferay//DTD Hook 6.0.0//EN" "http://
www.liferay.com/dtd/liferay-hook_6_0_0.dtd">
```

3. Change the header of `/WEB-INF/liferay-portlet.xml` to:

```
<?xml version="1.0"?>
<!DOCTYPE liferay-portlet-app PUBLIC "-//Liferay//DTD Portlet
Application 6.0.0//EN" "http://www.liferay.com/dtd/liferay-
portlet-app_6_0_0.dtd">
```

4. If possible, change the header of `/WEB-INF/service.xml` to:

```
<?xml version="1.0"?>
<!DOCTYPE service-builder PUBLIC "-//Liferay//DTD Service Builder
6.0.0//EN" "http://www.liferay.com/dtd/liferay-service-builder_6_
0_0.dtd">
```

5. If applicable, re-build services using ANT target `build-service`.
6. Upgrade the source code against latest portal service API (like `portal-service.jar`, `util-java.jar`, `util-bridges.jar` and `util-taglib.jar`)
7. And also upgrade JSP files against JSTL `1.2` and latest portal service API (like `portal-service.jar`, `util-java.jar`, `util-bridges.jar`, and `util-taglib.jar`).

Themes deployment

When deploying themes in production, static content needs to be organized properly, like images, CSS files, and JavaScript files. And furthermore, the portal core UI may not be sufficient for your own requirements, and you are going to override the portal core UI in plugins. This section will address static content and how to hook the portal core UI in plugins.

In addition, it would be nice that your websites could go mobile. WAP (Wireless Application Protocol) browser provides all of the basic services of a web browser, but is simplified to operate within the restrictions of a mobile phone. Of course, you can develop your mobile themes or WAP themes depending on your own requirements. For more details, refer to the *Chapter 10* of the book *Liferay Portal 6 Enterprise Intranets*.

Integrating UI CAPTCHA or reCAPTCHA with custom assets through plugins

As mentioned earlier, a Knowledge Base article can have a parent article and / or many child articles. When creating a new article, we need ensure that the response is not generated by a computer. In this case, CAPTCHA would be helpful. Furthermore, reCAPTCHA supplies subscribing websites with images of words that optical character recognition (OCR) software has been unable to read. This would also be helpful when users prefer hearing words, rather than reading them.

How do you integrate UI CAPTCHA or reCAPTCHA with custom assets Knowledge Base articles through plugin? In brief, it will take just three steps to integrate CAPTCHA or reCAPTCHA with custom assets through plugins.

1. First, add the following lines inside the method `serveResource` of `com.liferay.knowledgebase.admin.portlet.AdminPortlet`:

   ```
   try {
    CaptchaUtil.serveImage(resourceRequest, resourceResponse);
   } catch (Exception e) {
    e.printStackTrace();
   }
   ```

   The above code will generate UI CAPTCHA or reCAPTCHA and returned its content.

2. Then add following line inside the method `updateArticle` of `com.liferay.knowledgebase.admin.portlet.AdminPortlet` before creating a Knowledge Base article.

   ```
   CaptchaUtil.check(actionRequest);
   ```

3. Last, add the UI tag `liferay-ui:captcha` to the jsp file, that is, `/admin/edit_article.jsp` after the line `<aui:input name="title" />`:

   ```
   <c:if test="<%= article == null %>">
    <portlet:resourceURL var="captchaURL"/>
    <liferay-ui:captcha url="<%= captchaURL %>" />
   </c:if>
   ```

That's it. You did integrate UI CAPTCHA or reCAPTCHA with custom asset, for example, Knowledge Base Article, through plugins.

Hooking portal core UI in plugins

In case, you may be interested in overriding the portal UI in plugins, hooks would be helpful feature. Hooks is a feature to catch hold of the properties and JSP files into an instance of the portal as if catching them with a hook. Hook plugins are more powerful plugins that come to complement portlets, themes, layout templates, and web modules. A hook plugin is always combined with a portlet plugin.

In general, there are four kinds of hook parameters: `portal-properties` (called portal properties hooks), `language-properties` (called language properties hooks), `custom-jsp-dir` (called custom JSPs hooks), and `service` (called portal service hooks) as specified in `$PORTAL_ROOT_HOME/dtd/liferay-hook_6_0_0.dtd` or `liferay-hook_6_1_0.dtd`.

Suppose that we are going to override the portal core UI—Sign In portlet UI—in the Knowledge Base plugin, we could leverage the hooking capabilities.

Setting up hooks

It should be simple to override Sign In portlet UI in plugin Knowledge Base. It takes just five steps.

1. Create the portal properties file `portal.properties` under the folder `/docroot/WEB-INF/src`, where you can hook portal properties; you can add your own changes on portal properties here.
2. Create the language properties file `Language_en_US.properties` under the folder `/docroot/WEB-INF/src/content`, where you can hook language properties; note that you can hook multiple language properties for many languages.
3. Create a folder called `custom_jsps` under the folder `/docroot/META-INF`, where you can hook JSP files.
4. Then locate `html/portlet/login/login.jsp` under `$PORTAL_ROOT_HOME` and copy `/html/portlet/login/login.jsp` with all parent folders to the folder `/docroot/META-INF/custom_jsps`. From now on, you can update `login.jsp` as you expected.
5. Finally, create a XML file called `liferay-hook.xml` under the folder `/docroot/WEB-INF/`, and add the following lines, according to the above settings: portal properties, language properties, and JSP files.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE hook PUBLIC "-//Liferay//DTD Hook 6.0.0//EN" "http://
www.liferay.com/dtd/liferay-hook_6_0_0.dtd">
<hook>
 <portal-properties>portal.properties</portal-properties>
 <language-properties>content/Language_en_US.properties</language-
properties>
 <custom-jsp-dir>/META-INF/custom_jsps</custom-jsp-dir>
</hook>
```

You have now overridden the portal core UI—Sign In portlet UI—in the Knowledge Base plugin successfully. In the same way, you would be able to override any portal core UI. Moreover, you can hook portal properties, language properties, and portal services as well.

Static content deployment

For production, at least two Liferay portal nodes are required for a clustering environment. Of course, you can use Apache web server HTTPD for clustering purpose. Clustering allows us to run portal instances on several parallel servers (called cluster nodes). The load is distributed across different servers, and even if any of the servers fails, the portal is still accessible via other cluster nodes. Clustering is crucial for scalable portal enterprise, as you can improve performance by simply adding more nodes to the cluster. For more details, you can refer to *Chapter 11* of the book *Liferay Portal 6 Enterprise Intranets*.

It would be better to handle static content like images and CSS in a special way. That is, serve all images and CSS from Apache `htdocs` directly. How to achieve this? The following is an option.

1. Copy `$PORTAL_ROOT_HOME/html` to `$APACHE_HTTPD_DIR/htdocs`.
2. Copy `$AS_WEB_APP_HOME/${plugin.name}` to `$APACHE_HTTPD_DIR/htdocs`; where `${plugin.name}` represents custom themes, portlets, webs, and so on.
3. Add following lines at the end of `$APACHE_HTTPD_DIR/conf/httpd.conf`.

```
Jkunmount /*.jpg loadbalancer
Jkunmount /*.gif loadbalancer
Jkunmount /*.png loadbalancer
Jkunmount /*.ico loadbalancer
Jkunmount /*.css loadbalancer
```

Note that we have to repeat this process each time we want to upgrade the portal.

Performance tuning

As you may have noticed, frontend performance is important, because this is where more than 80% of the end-user response time is spent. Thus first performance golden rule is to optimize frontend performance. The following steps would be helpful to optimize frontend performance

- Use CSS Sprites as much as possible

  CSS Sprites are the preferred method for reducing the number of image requests. It combines the background images into a single image and then it uses the CSS background image and background position properties to display the desired image segment.

- Cache strip filter and compress filter

  The portal takes advantage of server filters to manipulate headers, strip spaces from the content and even for GZIP the content. Note that, filters are applied on each file on each request; it's expensive for the server in terms of both processing and memory.

- Put JavaScript at the bottom

  If possible you use the tag `footer-portlet-javascript` instead of the tag `header-portlet-javascript` in plugins `liferay-portlet.xml`. By this, the portal will download unnecessary JavaScript at the end of web page loading.

- Use the "Never expire" header

  As you know, web pages are becoming increasingly complex with more scripts, stylesheets, and images on them. Normally a first-time visit to a page may require several HTTP requests to load all the components. By using Expires headers these components become cacheable, avoiding unnecessary HTTP requests on subsequent page views.

  De facto for static components it is better to implement "Never expire" policy by setting Expires header. But for dynamic components, it would be better to use an appropriate Cache-Control header to help the browser with conditional requests.

- Compress server components and scripts with GZIP

  Compression reduces response times by reducing the size of the HTTP response in web server. Compressing as many file types as possible is an easy way to reduce page weight and to accelerate the user experience.

- Fast loading of CSS, images, and JavaScript

  It would be nice for CSS, images, and JavaScript to be loaded quickly when the portal got started. The portal has specified following properties in `portal.properties`.

```
theme.css.fast.load=true
theme.images.fast.load=true
javascript.fast.load=true
javascript.log.enabled=false
layout.template.cache.enabled=true
```

As shown in above code, the property `theme.css.fast.load` is set to `true` in order to load fast the theme's merged CSS files for production. While the property `theme.images.fast.load` is set to true in order to fast load the themes' merged image files for production. You can set this property to `false` for easier debugging in development. You can also disable fast loading or called pre-loading by setting the URL parameter `images_fast_load` to `0`. Note that fast loading of images means they

appear faster and make way for images that may have to be downloaded for the first time. The next time images are taken from the cache instead of being downloaded again. The price of being fast loading will make image loading time longer for the first time.

The property `javascript.fast.load` is set to `true` to load the packed version of files listed in the properties `javascript.barebone.files` or `javascript.everything.files`. Of course, you can set this property to `false` for easier debugging in development. You can also disable fast loading by setting the URL parameter `js_fast_load` to `0`.

For production, set the property `javascript.log.enabled` to `true` to disable the display of JavaScript logging. For the same reason, set the property `layout.template.cache.enabled` to `true` to cache the content of layout templates. This is recommended because it improves performance for production servers. Of course, you can set this property to `false` during development if you need to make a lot of changes.

Summary

In this chapter, we have looked at user interface in productions. Particularly, we saw how to:

- Use jQuery and custom UI in plugins
- Add Workflow capabilities and related UI in plugins
- Add custom attributes capabilities and their UI in plugins
- Leverage Friendly URL routing and mapping for UI
- Use Social UI—Open Social, Social Activity, and Social Equity
- Integrate CAPTCHA and reCAPTCHA with custom assets
- Hook portal core UI in plugins
- Deploy themes in production

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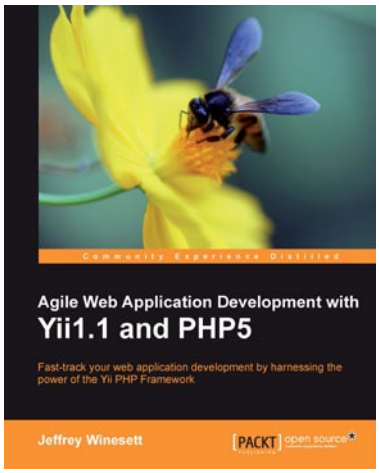
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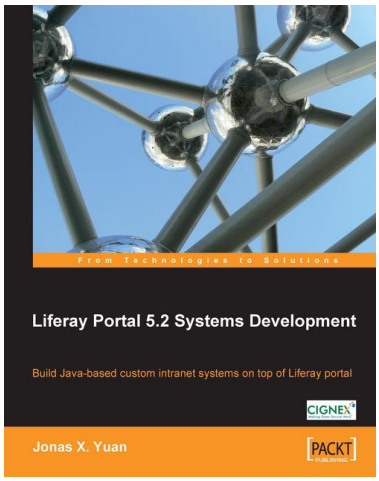
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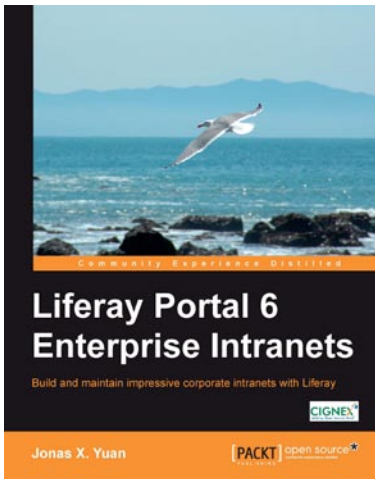

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